

COMPUTER WORK

THE NEWSWEEKLY FOR THE COMPUTER COMMUNITY

Weekly Newspaper

Second-class postage paid at Boston, Mass., and additional mailing offices

December 13, 1972

Vol. VI No 50

NEWSPAPER



CV Photos by V.J. Fennell

Shopping Around

Goofy and Pluto learn about terminals from Courier representative.

End Users Reap New Products Bonus

System Replaces 270X-Type Units

Floppy Disk Heart Of Data Entry Unit

By Ronald A. Frank

Or the CW staff

ANAHEIM The JICC communications and terminal products area included devices specifically tailored to meet the problems of users. In most cases the specialized products stressed improved cost/performance features.

Several products commenced previously separated functions to simplify the job of the operator. Included in this group was the Parallel Interface Extender (Pix) system from Paradyne Corp. which replaces IBM 360/370 270X-type line controllers in addition to terminal and modem functions.

Northern Telecom, a subsidiary of Northern Electric Co. of Canada, showed its low-cost Logic 16 data input set that combines the functions of a Touch-Tone-type phone with an acoustic coupler and a 16 character numeric display.

Designed for input applications such as credit card verifications, the device allows an operator to enter a customer's account number into the display before transmitting the data through the coupler to an audio-response equipped CPU. The numeric data can be entered in local mode and edited as required before the call is placed.

Northern Telecom has scheduled first

(Continued on Page 2)

By Michael Weinstein

Or the CW staff

ANAHEIM Cost breakthroughs, new technology advances and a proliferation of application-oriented systems made the Fall Joint Computer Conference a show with new products introduced to solve specific and costly applications.

Effective use of floppy disks by Potter Instruments' DDS 1073 data station offers users a low cost replacement for card punch data entry operations, according to the company.

The basic data entry and storage system is a combination of three integrated subsystems: 029-type keyboard with internal microprogramming for editing functions, 132 line/min printer and lightweight plastic floppy disk dynamic storage unit.

The heart of the system is the eight-inch floppy disk which is loaded into the memory drive system through a loading slot. When the slot is closed it automatically aligns the disk for recording operation, the firm stated.

Each 54 disk unit has a capacity of around 650K bits of information.

Once the floppy disk unit is inserted, data is input by an operator from the keyboard or under automatic program control with optional switching from program to program, a Potter spokesman stated.

Editing capabilities include search by record, search by id number, search by track or sector.

Visual display and output for the unit is the Potter LP3000 printer which operates at 135 line/min.

Once the user has entered the data on the disk and is ready for processing there are three ways to transmit the data to the central computing facility.

The standard method is via the mail with a printer-produced hard copy attached for verification.

A second method is an option to the basic system: converter for transferring

(Continued on Page 2)

Revamped Last Joint Gives User, Planner New Promise

By Edward J. Bride

And E. Drake Lundell Jr.

Or the CW staff

ANAHEIM The crossroads have been passed, and the right road has been taken.

Most of the planners and attendees of last week's Fall Joint Computer Conference used various words to express that conclusion but they all pointed to the increased emphasis on user topics, with little the program devoted to the users of computer technology; the move into vertical sessions aimed at specific markets; and the switch of site to Anaheim.

Last May, the show sponsor, the American Federation of Information Processing Societies, said it was "at the crossroads" of some very big decisions, including the possibility of changing the format to only one conference a year. That decision was made a few weeks later, and this fall conference was seen by many people as the transition.

Users and computer industry representatives had

an assortment of 60 sessions to attend, including four all-day seminars for users in specific industries. There were several half-day technical sessions, and evening sessions on varied topics, from privacy to history, were well-attended.

Users also got a wide-ranging education on hardware, as more new products were introduced than at recent JICs. The preponderance was in communications and data entry or preparation devices; while the large mainframes were again absent from the exhibit floor.

Latest figures showed that over 20,000 people attended the meeting, an increase over last fall's total of just under 17,000.

Exhibit space was not sold out, Aftis continually stressed, with 165 organizations filling 410 booths. Two booths were removed from the original layout because supporting columns in the Anaheim Convention Center made it impossible or inconvenient for attendees to see the displays.

The boothspace was given to the IEEE Computer Society and to the Reston's a student group studying computers.

On the technical program side of the show, the move into vertical sessions got high marks from most attendees, but the more regular technical program drew a mixed reaction.

The sessions devoted to banking, medicine, manufacturing and information data centers were considered well run and informative by most showgoers and they also drew good crowds.

The banking session in particular was singled out by users and non-experts in banks for its organization and content, and the manufacturing received much the same type of reaction.

On the other side of the technical pro-

(Continued on Page 6)



John Potter demonstrates Potters' DDS 1073 data entry system for the press.

Challenge Issued

DPers 'Fail' Social Role

By E. Drake Lundell Jr.

Or the CW staff

ANAHEIM Computer people have traditionally failed as social activists.

Joseph T. Rigo, assistant vice-president at Bankers Trust Co., indicated as much here last week in a speech challenging computer people to make a greater effort to carry through on projects for the larger social good.

Rigo speaking at a meeting of the ACM Special Interest Group on Computerized Society, noted in the past eight years there have been five great social movements: civil rights, antiwar, antipoverty, environmentalism and consumerism.

In each of the cases, he noted, there has been much initial interest by DPers which then subsided somewhat into a "more sustainable" position in society at large.

"Each stirred up computer people wanting to do something for society," he said, indicating that he was talking of the general "run-of-the-mill" DP person who held a full-time job, but who wanted to make some larger contribution to society.

"We look for some way to help change the world to make life better for other people without losing up our own lives in the process," he said.

But on the whole, he added, after the initial enthusiasm for the new cause

passes the computer people fade from the scene when the hard work begins.

One of the problems, he noted, was that computer people by themselves couldn't address many of the issues at hand and would have to join with other organizations to accomplish their objectives.

Another problem was that most of the people with whom computer people must interface are lawyers who can only think in terms of legislation or litigation to help solve the social problems.

Another problem, he noted, was that computer people often weren't experts in the areas that were of concern to the various organizations dealing with social issues, and the organizations often didn't want to have amateurs helping them.

This leads to another problem - often computer people sold socially active groups on ambitious computer-based projects, but when the time came for the hard work to implement the plans, the computer experts often disappeared.

But, nevertheless, "it is time for our community and social organizations to learn how to pool professional skills to solve problems. People who are experts in the problem area can work with those who are experts in the process, or some other field to develop solutions that neither could find alone," Rigo stated.

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Electronic Transactions Can Cut Banks Paper Jams — Page 12

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Multiprocessors Emerging

Multiple Minis Meaningful for Message Movement

By Ronald A. Frank
of the C.V. Starr

ANAHEIM — Multiprocessor systems using multiple CPUs, operating in parallel, are being developed experimentally at several universities and research centers, according to participants at a JCCC session on distributed computing. The concepts in these systems will impact heavily on commercial resource sharing systems, participants agreed.

The multiprocessor system based on interconnected minicomputers now appears to be feasible, according to William A. Wulf from Carnegie-Mellon University (CMU).

Raise Questions

Such systems raise questions concerning the "unknown problems of dividing tasks into subtasks to be executed in parallel," Wulf said.

In a multiprocessor system, each processor is actually a complete CPU with its own local primary memory and controllers for secondary memories and devices, Wulf said.

One multiprocessor system being configured at Carnegie-Mellon joins 16 DEC PDP-11s into a 32 Mbyte system for the real-time analysis of speech data, Wulf explained.

While little is known about multipro-

Museum Art Works on File

FAYETTEVILLE, Ark. The University of Arkansas here will serve as headquarters for a project aimed at establishing a uniform computerized museum data bank system.

At least 20 museums have computerized systems for cataloging data on their collections and there are five major exchange systems in operation, said Robert Chen, hall, executive director of the Museum Data Bank Coordinating Committee.

He said the committee plans to set minimal standard recording conventions for all museum data banks to facilitate the exchange of information.

His committee will also serve as a central office where potential users can obtain information on setting up their own systems.

The ultimate goal is the establishment of a nationwide network for the exchange of museum data, he added.



J.M. McQuillan

William A. Wulf

cessing structures and how to implement them, researchers believe these systems will become increasingly important as resource sharing networks become available to commercial users.

One of the critical operating points in multiprocessor systems occurs at the processor-memory interconnection (switch) point, Wulf said.

Peter Freeman from the University of California described a system with 16 memory modules interconnected to 16 processor ports using a 74-bit cross-point switch. The system analyzes artificial intelligence and uses PDP-10s.

Expensive Toys

"These networks can be very expensive toys for researchers, but they will also have to be cost-effective tools for commercial users," Ed K. Bowdon Sr., University of Illinois, cautioned the session participants.

"Every installation manager who offers contract or demand services" should be able to transfer his jobs to another processor when his CPU breaks down, Bowdon said. "This is where network computers enter the picture," he suggested.

The user "could not care less" whose resources he is using as long as he gets the best possible service at the lowest possible

price, he added.

In a discussion of the largest resource sharing system yet in operation — the Advanced Research Projects Agency (Arpa) network — J.M. McQuillan of Bolt, Berneck and Newman Inc. said under "heavy loads" throughput on the Arpa network was "degraded significantly."

When Arpa messages arrive at a destination Interface Message Processor (Imp), faster than they can be sent to the host CPU, "reassembly congestion" occurs, McQuillan said. This in turn leads to "reassemble lockup" in which the destination Imp is "incapable of passing any traffic to its hosts," he added.

With 10 or more links in use on the Arpa net with multipacket messages, "reassembly lockup" occurs almost immediately," McQuillan said. The addition of buffer storage at both the source and destination has helped to ease the reassembly congestion, he explained.

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Canadian Cities Study

Computer Can Protect Privacy More Than Jeopardize It

By Edward J. Bride
Of the CW Staff

ANAHEIM — Computers, properly used, provide more opportunity to protect privacy than to jeopardize it, Prof. John M. Carroll of the University of Western Ontario concluded from a Canadian study of institutions keeping data banks.

"I don't link computers with the invasion of privacy at all," he told an FCC evening session on security. Carroll said that complaints on the accuracy or necessity of personal data were not affected by the fact that some files were manual and others automated.

In fact, in the process of computerizing files, many serious errors were discovered in the manual version, he noted. The study was conducted last year under the authorization of the Canadian Departments of Justice and Communications. England's Younger Commission, the U.S. National Academy of Sciences (Westin) report and the Canadian task force all came up with similar results: "Most people don't give a damn" about the possibility of privacy invasion, Carroll stated.

The FCC session last week was attended by about 250 people, but by the end of 2-1/2 hours (fewer than 10 were left. Attendees suggested the session failed to give answers to the security problem, but session chairman Rein Turett noted that answers were not promised in advance publicity.

Commissions Failed

The three study commissions failed, however, by not investigating secret files of police agencies, Carroll agreed.

While some of the results of that study have a sameness, there are other facts that are not so well known and that are of great concern to Carroll, he indicated.

One large Canadian firm stores data with their U.S. counterparts (where such counterparts exist), and one-fourth of the Canadian firms will have files and DP operations actually located in the U.S., within the foreseeable future, he said.

The reason for this is that there is accruing a "surplus of DP capacity" in the U.S., and Canadians will probably in take advantage of this "Cybernetic imperialism, you might call it," he said, stressing that the predicted combination



John M. Carroll

of efforts presents a "serious future problem."

Since computer capability tends to be underutilized, he continued, the growth in data banks will be one of depth, rather than breadth. This presents still other problems to the protection of privacy, since more can be ascertained about individuals, rather than gathering a little data on many people, he noted.

Computer manufacturers should pay at-

tention to the need for a secure operating system, safe from tampering and from unauthorized access, consultant Stanley Rothman told the session.

Rothman said there are indications that users will bind together on a Federal Government level, and write procurement specifications that dictate the security of computer systems.

Rothman also said that in every case of states exchanging data files on individuals, uniform state laws should govern these exchanges. Uniformity will be difficult to achieve, he noted, but it is necessary if data is to be exchanged between States.

Chairman Turn, speaking on the security problem, said only that the selection and implementation of appropriate safeguards are "difficult and poorly understood processes."

As a beginning, Turn suggested users must appraise the value of their data to their own company or agency, and then try to discern how much the data might be worth to an intruder. After assessing the cost of protection, users would then

be able to have a starting point to achieve security.

Turn, a data security specialist with the Rand Corp., said that criminals have been able to access and remove files from both manual and computerized systems.

Such unauthorized access could take place in business, too, and "what is needed is data security engineering" to prevent these problems, Turn said.

In general, governments are willing to spend large amounts of money on physical security; businesses can assess the value of proprietary data, but "personal data is subjective" and difficult to evaluate.

The circumstances of the individual and the possible market for data make it difficult to put a price on the data, he explained. Also, it is difficult to measure a system's susceptibility to subversion by people, rather than by technology.

Few questions were posed to the panel regarding ethics, politics or the technical ability to invade privacy through data banks, although the audience and the panelers familiar with the many studies undertaken in the past year on this issue.

Full System Depends on Good Balance

By Marvin Smalheiser
CW Correspondent

ANAHEIM — The key to creating a full computer system for manufacturing is setting up good balances, Richard Lilly told an all-day FCC seminar on DP in manufacturing.

Lilly, president of Manufacturing Management Sciences Inc., Burlington, Mass., said manufacturing systems fail because they are not properly balanced.

A major sign producing the imbalance is the lack of effective documentation.

There must be sufficient information at all levels from the floor person to management and it must be enough for upper management to establish inventory policies and examine alternatives.

Also, operating management must have sufficient documentation to understand the problem and the system involved. Operating personnel must be able to understand reports, exceptions and actions on a day-to-day basis.

Lack of continuing management con-

trols, Lilly said, prevents management from establishing effective measurement of performance, a cause for "one of the main reasons for failure of an inventory system."

The inventory management system control report, Lilly said, is the most vital management report in the system because at a glance the inventory manager can quickly determine any fluctuations, trends or out-of-balance conditions.

Another fatal sin, he said, is the inability to trace updated transactions.

"A major complaint of inventory control personnel is that once a transaction updates an inventory status, either the time required to trace the transaction is prohibitive, or the transaction disappears completely," Lilly noted.

"Thus, when the inventory record and physical counts are not identical and there is no audit trail information to show the reason, the system's credibility decreases at each occurrence until at some point the user simply bypasses the system

by setting up his own manual subsystem.

"To correct this, the user must be given the ability to trace at least 30 days of transactions through inquiry. In other words, an audit trail of all processed transactions must be chained to each item."

Regarding the inability to trace rejected transactions, Lilly said, the problem results because there is no positive control of transactions once they have been rejected.

"Any rejection should at least suggest a correction, yet no formal procedure for error correction exists. There must be some positive proof that the correction has been made."

Lilly also cited lack of adjustment data filters and "ignoring the presence of lumpy demand."

"One of the main benefits to be gained by computerization of inventory," he said, "is the measurement of the error in the forecast and its use in establishing safety stock to meet a required level of customer service."

"Most often overlooked, however, is the fact that a number of items do not have a demand which is predictable, due to its lumpy character."

"The user must decide whether he can justify carrying a high level of inventory to accommodate the high demand (peak) that occurs infrequently."

'Getting Most out of Nuts and Bolts'

Special to Computerworld

ANAHEIM — Manufacturing firms which want to use the computer to its best advantage should treat it as a low value item like a nut or a bolt.

Oliver Wight, a consultant, also told an FCC seminar: "You need it (the computer) to put your product together, but the more standard it is the better you are."

"People make the system work," the system doesn't do anything. It just generates information," Wight told an audience of about 200 persons at the Disneyland Hotel convention center.

"The computer is a way to enhance people so they can do a better job," he said, but cautioned against making the computer system too automatic so the people working with it will have control over it.

"The worst recommendation for a system generally is that it works in another division," Wight said, and he commented that such a system is hardly ever transferable unless the people using it are also transferred.

Manufacturing with the aid of computers, Wight stressed, is an elusive area "but a very, very high payoff."

Wight said, however, there is "nothing profound" to making computer systems work in manufacturing and distribution, but he called "secrets" of making them work.

The first, he said, is recognizing the

difference between a formal system and an informal system.

"The limitations of the annual system used in manufacturing plants has made it impossible for a formal system to work," Wight added, and attributed the failure of many computer systems to the inability of processors to recognize that there was an informal, manual system being used.

It is not the same as mechanizing clerical work, Wight said, and added that many analysts have made the mistake of automating the formal system when it was the informal system that really functioned.

"Priority planning is the guts of production control and you have to control capacities and priorities," he indicated. Material Requirements Planning, he said, is necessary for production control of any product with dependent materials.

Wight also said that both involvement and education are necessary for inventory and production control.

"Involvement means accepting the responsibility for the success of the system. You have to educate the user right from the beginning, not after the system is designed."

Wight also warned against frivolous "People on the floor abhor sophistication. The simpler your system the better. Sophistication doesn't work today. To day we are having an orgy of sophistication and nothing kills a system faster," he

noted.

Give the people control over the computer, he said. "Don't let the computer run the people."

MRP a Boon to Inventory Control

Special to Computerworld

ANAHEIM — Material Requirements Planning (MRP) is an inventory and production control tool for manufacturers using computers came under close scrutiny at one FCC seminar.

Robert Galante, vice-president, Manufacturing Management Sciences Inc., Burlington, Mass., explained how to set up an MRP program and made scheduled and told his audience at the Disneyland Hotel to be realistic about what such a system can perform.

"If the system is not set up effectively, the informal system that existed before will come back."

He warned the user against trying to put more into the system than he wants to put out.

To counter resistance to an MRP system, he said, it is necessary to go directly to the general manager. And he added the system must be built as a bridge between manufacturing and sales.

Once the system is under control, he said, the result is that there are not many fires "with everybody fighting everything and anything because they never know what will come up."

The net change system for requirement planning, Galante said, is really the long-term solution because it allows the user to change all items when any one item is planned changed. He suggested that frequent or even daily replanning could be feasible, depending on the company and its products.

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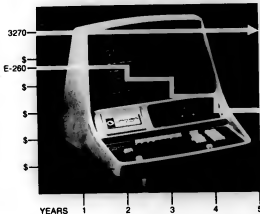


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CW panorama by V.J. Ferrier and M. Flinn

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Most Users Happy With FJCC Format

(Continued From Page 1)

gram, the reaction covered the extremes. For example, the six sessions that effectively constituted a "mini conference" on measurement of computer systems received an enthusiastic reception from attendees. In fact, so many wanted to attend these meetings that standing room only was the watchword as the sessions spilled over into the hallways.

Several users commented on exploring one idea in depth, such as the measurement session and most seemed to welcome the idea.

"We're just getting into this area," one said, "and in a day and a half I can get all the basic information I need for future planning. It's a great idea."

There was some criticism, however, of the more technical sessions, with several users and industry people indicating that some of the meetings were too narrow in scope to be of much interest to anyone except the small circle of other experts in the field.

"I come here for an education," one source said, "but most of these technical meetings I have been to have been so technical and detailed, I couldn't really understand them. It seems to be one small group of technical experts talking to each other in many cases," he added. Exhibitors generally liked the show, and many said it was about time to sing "happy days are here again."

While the upturn in attendance and in attendees' attitudes on buying was seen as a positive sign, Alips was even more optimistic about next year's National Computer Conference and Exhibition. Officials predicted 30,000-50,000 would attend that conference, the first of the annual meetings.

The move to Anaheim, from what was becoming a traditional FJCC site in Las Vegas, was done to bring the conferences closer to users and to computer designers, Alips said.

The exhibitors, though, closed at 6 P.M., leaving little time for some users to view what was heralded in Alips publicity as the latest in computer products.

Alips explained that the exhibitors felt "the people they really wanted to see" would be able to get time off during the day. The exhibitors were also concerned about the ability to staff their booths during evening hours, Alips reported.

Site planning for the new national conferences will be on a three-year cycle, going from the East to the Midwest and then West Coast, Alips related. Thus, New York will be followed by Chicago for the 1974 show.

A site for 1975 has apparently not been chosen, but Alips said that Anaheim remains a good candidate for future conferences because of its location in the heart of the West Coast computer industry.



FJCC Panorama of the Exhibit Floor



Puppets marched to the recorded sales pitch of Ampex cooking Chef P. Rhipheris and "Sylvia," cooking up a mixed system.



Sometimes the plotters gave the pinups too much of the wrong thing.



General Automation raffled off this new Subaru automobile to demonstrate its SP-16 mini's prowess at checking auto-electrical systems.

A Look at the Last FJCC



One writing table is as good as another.



ACM's booth was to the point.



Keep smiling
Photos by V.J. Farmer



Three days later ...



Kodak presented its KOM Microfilms.



Vortrax sent its audio-response system from



Rixon/Sangamo uses card tricks to gather a crowd, outer space.

Use of Measurement Tools 'Responsibility of Management'

By Don Levitt

OF THE CW Staff

ANAHEIM — The use of any techniques to measure or improve the reliability of software is a management responsibility. No matter how good a technique may be, it won't do any good if management doesn't know how it should be used and doesn't require its careful implementation, Commander Grace Hopper told the FIC session on Measurement of Computer Systems: Software Performance.

Even the increasingly popular concept of developing proofs of correctness of programs is no assurance that the software is completely good, she said, noting such proofs generally confirm only that good input produces good results. The proofs do not explicitly require that the programs being analyzed trap all invalid input data, and that is a major omission, she said.

Robert Gordon, a DP consultant, was critical of the performance techniques for a different reason. He said the DP community had to put "first things first" and define where it is going, "so that we'll know when we've gotten there."

Specifically, he challenged several of the authors who had preceded him on the panel to provide a detailed definition of

what they meant by "reliability" of a software product. Is this simply a measure of the program working correctly for a given period of time? Or can a program, operating correctly, but carrying a large segment of unexecutable code, also be considered reliable, even though the unused code has never been tested? he asked.

Commander Hopper noted that there had been absolutely no reference in the preceding discussion about the need for standards so that software, like many

Measurement: Hardware or Software?

other American products, could reasonably be built from interchangeable parts. Without such standards, every piece of software has to be hand crafted and, in effect, hand-tested to know what it will do, she said.

Gordon also raised questions about non-programming systems that were intended to improve communication between the user, the analyst and the programmer. In particular, he asked Alan Merten of the University of Michigan to explain how a



On Photo by Edward T. Brady

Panelists Robert Gordon and Cmdr. Grace Hopper lead session on Software Performance.

user who had no knowledge of the capabilities of a computer or its peripherals could be expected to use Problem Statement Language (PSL) effectively.

PSL, Merten had said earlier, is a free form language that allows the non-DP-oriented user to describe what data he has available and basically what he wants to do with it. It is intended to support the validity of the request, the correctness of the programmed solution and the effectiveness of the solution as it is performed.

By design it is data-oriented, he noted, and is not concerned with what device the programmer chooses as an output medium, for example. This was specifically the problem Gordon was concerned about: with PSL, the ultimate user might not even be aware of the possibility of graphic display which might be far more effective than the tabular printout the programmer chose to generate.

Currently PSL has an analyzer which reviews the completeness and consistency of data being proposed for a programming project, but it does not review any logic plans. It could conceivably be used to generate code but this would probably be limited to the Data Division of a Cobol program, Merten said.

Prof. Norman Schneiderwind of the Naval Postgraduate School was under heavy fire during much of the session for his attempts to classify the reliability of a software program. In his view this could legitimately be a mathematical expression of the probability of occurrence of a given type of error in a given amount of time.

This type of reliability could be estimated by the program developer based on experience with the software prior to its general release. With the ability to define the reliability of a given program, the developer could also get better control over test costs, and a better understanding of the characteristics of a program that affect reliability, Schneiderwind said.

Reliability in Gordon's view was more closely related to assurance of continuous correct functioning of a program, somewhat akin to what others have called certification. The concept that a program is 95% sure of running correctly for six months, or a year, left others in addition to Gordon unsatisfied. One user noted that concept is like weather reports that predict 95% chance of good weather. It's great unless you get caught out in the 5% rain. Then you're soaked, he said.

Si
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The Question Is:

Will System Parameters Should Be Measured?

By E. Drake Lundell Jr.,
on-the-job

ANAHEIM—The largest problem facing developers of measurement systems to analyze system performance is that no one knows exactly what to measure, attendees at a session on "Measurement of Computer Systems—System Performance" agreed.

Everyone has his own ideas of exactly what should be measured to gain a handle on the effectiveness of a complete computer system, Kenneth Kolenc, a software engineering consultant, indicated.

And until the practitioners in the field can agree on the parameters that are necessary for effective measurement, the field will be held back, he said.

Today the use of computer performance analysis ranges from feasibility studies through post-implementation hardware augmentation, according to Seymour Jeffrey, Chief of the Systems Development Division at the Institute for Computer Sciences and Technology of the National Bureau of Standards.

Presently the techniques are used basi-

cally, he said, to maximize throughput, decrease turnaround time, identify levels of utilization, modify device allocation and determine modification requirements.

The presently available tools to perform these functions include hardware monitors, software monitors, simulation (discrete event and simulator packaged accounting systems and benchmarks, he noted).

Of these, he indicated, hardware monitors either on a per unit basis, degradation effect on the system being studied, while software monitors have a low to medium degradation effect.

The level of detail produced by the software monitors, he said, is generally in the medium range, while with hardware devices the level is dependent on the device and covers the entire range from low to high detail in the analysis.

He also noted system overhead for the hardware devices is essentially zero, with only extraneous software required.

Software monitors, however, usually require 5K to 10K of core space and 3%

to 10% of the CPU cycle times, he said.

There are no detailed studies of how users are presently using measurement techniques, he indicated, but a recent survey of government computer users with measurement systems indicated software monitors were used in around 23% of the installations, simulation in around 18% and hardware monitors in about 1%.

Measurement: Hardware-Software?

In the commercial world, he noted, a recent survey by the code indicated 54% of the users were presently using either hardware or software monitors in order to perform hardware testing and about 59% used the devices to perform some operating system tuning.

While the tools available to the user in

order to perform measurement studies are increasing in sophistication, he said, "unfortunately the user has not always been able to use the sophistication of the tools."

He noted development is underway on hybrid hardware software monitors combined with accounting systems to "show complete data for performance analysis."

Conventional monitors for real time information based on a user's questions about system performance will also be available, with the on-line program possibly residing in a minicomputer.

He also noted one of the problems with hardware monitoring is the difficulty of identifying probe points and making physical connections, but said that a central probe point on mainframes could eliminate this problem.

Another thing that could help users perform analysis work would be the development of CRT displays that allow the analyst to easily visualize the performance measurement and that give instantaneous display of measurement data.

One of the most significant developments in the future, he indicated however, would be development of hardware monitors built into the mainframe by the hardware manufacturers, but some in the past have wondered if the mainframe makers really want users to be able to quickly identify the performance of their systems.

But even with all of these tools, Jeffrey said, "the EDP manager should be the developer of CRT displays that allow the analyst to easily visualize the performance measurement and that give instantaneous display of measurement data."

"It takes a trained expert in the use of these tools and in the hardware and software that the tools measure to perform the required study. The tools may serve that end by simplifying, but it is man's ability to properly interpret the measurements taken by the tools which makes for successful performance analysis," Jeffrey concluded.

Users Best Catalyst for New Tools

ANAHEIM—It is surprising that hardware monitoring tools are not more widely used, because a small investment can produce tremendous savings, according to panelists at a session on "Measurement of Computer Systems—Hardware Monitors and Their Applications."

The panelists indicated users must become more active in the design phase for these devices in order to press the manufacturers to supply tools that are more effective and meet the user's needs more effectively than at the present.

Richard Ruud of Applied Computer Technology said the current tools available to the user are "fairly good" and that manufacturers often have a hard time getting capital from investment sources to develop such systems because of the impression that users are not interested in monitoring.

User Ultimate Loser

The user is the ultimate loser, he said, when money is not available for development efforts in this area, because there will not be as many tools available in the future as firms drop out of the market.

The greatest need, he said, is for systems that take advantage of the capabilities of minicomputers used at the heart of the monitoring system.

Both hardware and software are "absolutely essential" for the development of effective monitoring tools and neither is fully effective without the other. Because of this, he said, the artificial barriers should be dropped and the two should be joined in future monitoring systems.

Another defect in the presently available systems, he said, is that probes and counters are not fast enough for the super-sophisticated computers on the market. The technology is presently available to develop these faster probes and counters, but no one is taking advantage of it, he indicated.

Ruud challenged users to press manufacturers for more effective measurement and he suggested that users and manufacturer teams might be best to develop the software needed since the user often has greater software expertise than the manufacturer.

Jerre Nee, a user of the Applied Computer Technology monitor, told the group that future development efforts should be directed toward developing systems that can answer significant user questions and not just monitor the system.

But in the long run, he said, the answer to monitoring is to build them into the mainframe, noting that "if a monitor and

probes can be built into a Volkswagen, they certainly should be built into a computer."

No warned other potential monitor users that they should get started monitoring their systems until they have a well developed plan of where they want to go and what they expect from the effort.

He also backed the contention that the user needs both hardware and software monitoring systems to be effective. He also stated a user has to constantly make sure he is getting the measurements he needs and noted it is sometimes hard to tell if he is measuring the right thing and that the measurements are accurate.

There is often unused hardware capacity buried in large systems, he stated, that could be used by innovative users for monitoring purposes.

He also warned users about unexpected problems when they begin monitoring and noted that they might uncover unexpected inefficiencies even the designers don't know about.

Henry Curot, formerly of Boole and Babbage and now with Hewlett-Packard, said users of measurement tools should be the ones to determine and direct future development of these tools.

"Only when users begin to systematically evaluate and design measurement

tools, will measurement become a science," he declared.

What should a user watch for when looking for measurement tools? Maintenance of the effort in this area, Curot said, since the best tool available is meaningless without proper maintenance. Another factor to be considered is the expandability of the system, he said, and users should make sure that their monitors can meet their future requirements as well as their present needs.

The user should also press for good useable documentation and training and should make sure the system is compatible with other measurement tools available.

Measurement: Art or Science?

ANAHEIM—Measurement and performance evaluation of computer systems is "an art trying hard to become a science," session chairman Dr. Arnold F. Goodman of McDonnell-Douglas told a session on "Measurement of Computer Systems: Executive Viewpoints."

At the same time, Goodman indicated that measurement of the effort in this area at present involve measurement and performance evaluation after the fact—after a system has been designed and built.

He indicated tools are needed to predict how a system would perform before it was built and placed on the market so that inefficiencies could be caught early enough to be designed out before the system is installed.

Two Different Approaches

Presently, he said, there are two different approaches to the development of measurement systems: a theoretical approach and one based strictly on quantities of collected performance data.

In the future, he said, there will be a need for a combination of the two in order to develop effective measurement systems that cannot only measure after the fact events, but that will also have predictive ability.

Robert Johnson of Burroughs Corp. indicated that in the design process, "measurement often comes last and is frequently forgotten" by computer designers, at least "forgetful until it is too late."

He said it is amazing that at present "we have a \$10 billion industry and still no one can tell us exactly what our product does."

He said there is a need to come up with

a simple measure to describe various systems performance factors in order to simplify the user's decision process when purchasing new systems or adding to present ones.

In many cases it is hard to adequately describe system performance, he said, because "many of the things that make systems easy to use, don't get benchmarked and add to the cost."

"A total and ultimate evaluation of any product is not and cannot be an absolute science," according to Louis Robinson of IBM.

This is because many of the attributes of computer systems are not quantifiable or reducible to set or exact figures, he said.

Many people look at the same product in different ways, he continued, so what is a plus to one user might be a negative feature to another.

A recent study for the General Accounting Office indicated that a true measure of productivity "should take into account both efficiency and effectiveness, with efficiency relating to the cost of producing output and effectiveness to the value of the output," according to Edward J. Mahoney, deputy director of financial and general management studies for the government agency.

In order to help perform studies of effective systems, Mahoney urged the General Accounting Office with "outstanding examples of highly productive DP operations and why they are productive," and promised that the government would share information it develops in this area with users.

Double Take

SPEAKERS PRACTICE

WINE TASTING

What Are Options?

Optimizing OS? Evaluate First

By Don Levitt
of the CW Staff

ANAHEIM — The functioning of a given operating system often can be optimized by knowledgeable users, but the decision optimization should take depends on the individual innovator's evaluation of the options open to him. The trade-offs have to be considered, according to T.J. Teorey of the University of Wisconsin.

Speaking to the FICC technical session on operating systems, Teorey outlined, as an example of possible trade-offs, what users should consider before implementing a disk-scheduling system.

His think-about-it-first approach was echoed by James C. Browne of the University of Texas who described the possible interactions of multiprogramming, job scheduling and CPU scheduling.

Later in the same session, Daniel L. Murphy of Digital Equipment Corp. described the philosophy of the Tenex virtual memory operating system for the Decsystem-10 and Karl N. Levitt spelled out some of the work being done in proving the "correctness" of programs at Stanford Research Institute.

Teorey noted some users contend there is only one disk scheduling policy, while others see the possibility of selecting the most appropriate from the several scheduling schemes available.

On the other hand, he suggested, it is entirely possible that factors having nothing to do with the disk itself may make it completely useless to install any sort of scheduler to optimize the disk accesses.

Users must consider the effect of scheduling in terms of the performance of the single disk device, the disk subsystem (if there are more than one disk) and the total multiprogramming system. To understand the trade-offs, Teorey's group de-

veloped a set of meaningful models of possible disk schedulers.

'First Come ...'

These models allowed him to study the throughput, mean response time and variance in mean response time made possible with the different possible schedule schemes. He noted these schemes included a first-come-first-served approach, one in which the shortest seek time was handled first, and three variations of scanning for seeks.

The effectiveness of the schedulers was influenced, he found, by the level of multiprogramming and of multitasking, by the pattern of the load imposed on the channels and controller as well as the disk itself, and by the presence or absence of rotational position sensing.

There are several conditions in which seek time is not, and cannot be the dominant consideration, he added, citing multiple track records, sequential processing and write-and-verify situations as examples. In these cases, seek time optimization is a worthless goal and might just as well be forgotten.

The choice of job scheduler and CPU scheduler must also depend on the desired goal of

the system, Browne told the overall audience at the morning session. There are four separate approaches to both these scheduling operations and the combination used can have an impressive effect on the system.

Working on a CDC 6600, he built models of the possible schedulers, including — for both job handling and CPU utilization — the "non-scheduling" first-come-first-served approach. Other techniques included "shortest time to run first," "smallest cost first," and "smallest memory first," for job scheduling, a round-robin, "shortest time remaining first," "smallest burst time next" or "longest burst time next" techniques were considered as bases for CPU scheduling, he said.

Throughput Rates

There is an enormous difference in the throughput rates produced by the different job schedulers, he added, citing multiple track records, sequential processing and write-and-verify situations as examples. In these cases, seek time optimization is a worthless goal and might just as well be forgotten.

The choice of job scheduler and CPU scheduler must also depend on the desired goal of



Dir. Photo by J.A. Farmer
Daniel L. Murphy

for the Decsystem-10, Bolt, Beranek and Newman Inc. had three goals, DEC's Murphy told the session. The system was intended to simultaneously support (1) on-line edits, assemblies, compiles and executions of the resulting object code; (2) very large jobs that wouldn't fit in available real core; and (3) very small highly interactive jobs.

To do this, BBN built a paging hardware modification for the KA10 model of the DEC mainframe. As a result, the system now provides a 256K-word virtual memory for each process, and backing for a multiprocess job structure with software interrupts. A general and powerful file system is provided along with what Murphy called a "human-engineered" command language.

Program pages, under Tenex, are 512 words long, he added, then noted this page size was used just because "it didn't seem too big, and it didn't seem too



T.J. Teorey

small." The system allows the use of non-contiguous slots in real core and supports the use of data and programs from various sources.

Described as "not quite as powerful as Multics," Tenex makes good use of real core, Murphy explained, by continuing DEC's standard approach of reentrant code for the basic programs used by all, and "private data" exclusive to each user. Tenex carries the concept further, however, in supporting the use of private libraries as well, he said.

Tenex utilizes a system of Job File Names, made up of a file identifier and a page number, to pinpoint the specific page each user process is accessing. This allows several processes to access the same page, if the need arises, concurrently without conflict. The techniques also enable a single user to access several pages concurrently or sequentially, he added.

Software Complexity the Limiting Factor

By Don Levitt
of the CW Staff

ANAHEIM — Complexity of software is the "third dimension" in studying how systems work, and, compared to the first two dimensions — storage cost and throughput — complexity is the limiting factor. "It has reached the point where users find it easier to understand how a computer works, than how an operating system works," Dr. Harlan Mills of IBM's Federal Systems Division reminded one of the FICC sessions on software

engineering.

Earlier, Clark Weissman of System Development Corp. told another session on the same topic that software costs were no longer acceptable, particularly in the light of cost/performance reductions in hardware. But, he added, several users have been developing tools and techniques, and methods and theorems to attack the problem.

Part of the problem according to Dr. Fred Haney of Xerox, is that even if modular programming techniques are used, and used well, changes are needed, and a change in one module can be expected to trigger a chain reaction in other modules throughout the program or system.

The reaction may carry across modules on several levels of relationships, he noted, so even strong efforts to isolate modules from one another in that way may not be effective.

Nevertheless, the modular conception, analysis (MCA) approach can be used to estimate the cross-module effect of a change, either after the need for a change has been revealed by a program failure, or before a desired change is made to "enhance" a system.

With MCA, he said, a system is recognized as hierarchical in structure, perhaps consisting of subsystems, components and modules, with some interdependence possible between parts of the system at any level.

Relatively simple matrices can identify the number of possible impacts a change can have on the system, including perhaps noticeable effects on the modules which started when it was first changed.

MCA differs from earlier techniques with similar goals in that

it considers just the internal system structure and not its environment. It uses a simple algebraic formula and can be applied regardless of the type of change being made or contemplated. In any case, he said, it has succeeded when applied to work Xerox has done to maintain its Universal Timesharing System and it is clearly better than intuition.

James Brown of TRW Systems Group attacked the problem of software development from a different angle, describing how his company developed an automated testing technique. It seems to go a good bit of the way toward solving the usual problems:

- How much testing is enough?
- What can be done about the high cost of testing?
- How can the results be made more visible?

How Systems Work

- What can be done to improve the confidence in the final product, for both the user and the supplier?



James Brown

The Product Assurance Confidence Evaluation (Pace) program includes a management control and level of objectivity on the testing process that TRW just didn't have before, Brown said. The technique makes the user approach his problem and solve from the start point and not go to a new step until he has solved the previous one. In effect, it directs the programmer toward "top down" or structured programming.

One of the elements of the Pace system, Brown said, is a Fortran source code checkout system called Flow. Even without executing the target program, Flow can report many things about how it would run, he said.

Flow's ability to identify those parts of the target program that would never have been accessed or executed is perhaps its greatest advantage, he added.

Other printed output from Flow includes timing studies to support code optimization efforts, and several trace routines. One trace display aids debugging, while another option identifies and further clarifies program logic.

By printing test results, Flow quantifies test efficiencies, and cuts down on the time it takes to show programmer and user both what happened in the test and ultimately increases the confidence of both in the reliability of the software when it is delivered.

Although Flow or the other elements of the Pace system don't directly determine how much testing is enough, they do provide a teaching function (as a byproduct) so users can realize when further effort is justifiable and when it is not worthwhile in terms of improvement that can be expected.

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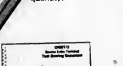


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For the Inexperienced User Debugging Tools, 'Natural' Input Ease Programming

By Don Leavitt
or the CW Staff

ANAHEIM—Much work has been done to make the power of the computer accessible to the inexperienced programmer and to the non-DP professional, and efforts in this direction are continuing at an increasing rate, according to Prof. Howard Morgan of the University of Pennsylvania.

Chairing an FJCC session on Human Engineering of Programming Systems, Morgan noted that some of these systems have been built to support the user's natural language input; others have eased the debugging of programs written in "conventional" programming languages.

Thomas Williams of System Development Corp. described an experimental, interactive graphics system called The Assistant Mathematician (TAM). The TAM user works on a data tablet as an I/O device, entering data and operations to be performed using hand-written symbols. The system responds

through a CRT unit whose screen is rear-projected onto the data tablet, Williams said.

The system has a basic repertoire of 120 symbols, but each user defines the way in which he writes these symbols so there are virtually no restraints in the input form, as long as the particular user is known to the system. TAM is able to perform most mathematical operations working from the same notation the user would utilize if he were solving the problem with paper and pencil.

Developed jointly by the National Aeronautics and Space Administration (Nasa), Advanced Research Projects Agency and SDC, TAM effectively isolates the user from programming in the usual sense. Even common mathematical constants such as π are built-in, Williams noted.

The system includes editing capability and prompting of the user when an unrecognized symbol is entered, but some

problems still exist, he added. Perhaps the biggest of these problems is the "normal ambiguity of mathematical notation," he said, admitting the problem of how to interpret parentheses had not yet been solved.

TAM's method of "protecting" the user from the computer contrasts with the debugging routines for PL/I that have been implemented on the MITS/Honeywell-developed Multics virtual memory time-sharing system. These allow the user to work actively with the language itself to develop his program.

Multics is written in PL/I, Barry Wolman of Honeywell Information Systems told the session. This means the debugging tools for user-level PL/I programming are better than they are for some of the languages less critical to Multics. And virtual memory is directly useable by the PL/I user, since the virtual address corresponds to the PL/I pointer value, he noted.

Debugging support includes a

run-time symbol table, a map of the object program and, after execution, a profile table, showing how many times each source statement was executed.

The Multics PL/I debugging package also provides the user with control "hooks" throughout his program. These hooks can be used any way the user wishes to set up breakpoint controls or take execution controls, for example—with the definition of how they are to be used determined at run-time. Two consecutive tests could provide different debugging sup-

port, he noted.

Carole Dmytryshak, vice-president of Bankers Trust Co., described a Fortran-based Investment Analysis Language (IAL) which falls somewhere between Multics's PL/I support and TAM in the way it isolates the user from the programming language. IAL allows the user to access predefined Fortran subroutines by function names that are significant to the user.

Most of the users have a familiarity with Fortran, she admitted, and this makes the use of IAL easier.

NAS's Oettinger Says

Public Best Served By Intergroup Study

By a CW Staff Writer

ANAHEIM—"How information technologies are best to serve all Americans is a matter of vital public concern" that should be discussed by interdisciplinary groups made up of industry figures, scientists and others, according to Anthony Oettinger, chairman of the Computer Science and Engineering Board of the National Academy of Sciences.

Oettinger, the luncheon speaker at the Fall Joint Computer Conference, noted many of these broad issues had been handled by the board in the past, but the board was now being phased out due to a lack of funds, leaving a great deal of unfinished work.

Issues Studied

Issues that have been taken up on an interdisciplinary basis include studies of the state of U.S. technology in relation to the rest of the world, the problems of interconnecting computer equipment with the communications system, and an exploration of the current and future status of information technology in library systems.

One project under study since the board was founded, Oettinger noted, involves the issue of privacy of records stored in computerized data bank systems.

Interdisciplinary Approach

The interdisciplinary approach to all problems was the key to the board's success, he indicated. "Above all, it was necessary to overcome that traditional propensity of the scientific and technological community to matter into its own beard or whisper into its patron's ears, in favor of addressing the general public in a loud clear tone," he stated.

Only through the closest cooperation among experts of the most varied kinds and between these experts and the ablest generalists available in the nation

can we begin to discern the whole range of technical alternatives that deserve consideration in important national policy issues," Oettinger opined.

Funds Expired

And while admitting it was not perfect, he claimed the Computer Science and Engineering Board "has the merit of being an approximation to the ideal."

However, he said, "the money has run out. On July 6, 1972, the National Academy of Sciences asked the Computer Science and Engineering Board to bring its currently committed

work to orderly completion and to enter a period of 'hibernation' pending an appraisal of its future."

"There is an obvious moral to this story. I have described to you various conditions that seem necessary in striving for a national perspective in meeting the need for continuing evaluation of public policy alternatives."

"However necessary, these conditions alone are not in themselves sufficient. Something more is needed: finding this something is a responsibility we all share."

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FICC Banking Session

Electronic Transactions Will Cut Bank Paper Jams

By Michael Merritt
Special to Computerworld

ANAHEIM—Banks are more interested in doing away with checks than most people would expect, according to an FICC session on "Computers in Banking and the Electronic Payments Mechanism." And some bankers are pretty interested in some non-traditional computer-aided banking techniques.

A major concern of banks is the overload of paperwork, according to John Reed, a vice-president of First National City Bank in New York. Reed sketched the size of the problem of dealing with all the paper generated in paying a year's bills and cashing a year's checks in the U.S.

There are about 66 billion transactions a year of over \$2, Reed said. Of these, about 50 billion take place outside the home—purchases at stores, money deposits at banks, and the likes of this 50

billion, about 12 billion involve checks. Another five billion transactions take place at home or through the mails—sitting down and writing checks to pay bills, for example. Five billion more transactions involve individuals and institutions—five billion payroll, social security, pension and welfare checks. And institutions—companies, banks, government—account for almost six billion transactions between each other.

Bankers are attacking this morass of transactions in several ways, Reed said. Some banks have begun to offer jumbo checks—one signed check that directs the bank to pay several bills at once. Jumbo checks can cover rent, mortgage payments, bank credit card bills, telephone, water, light and other bills, all at one check.

Another technique is use of automatic crediting and debiting of checking accounts. The bank, for example, may have

an agreement with an employer to automatically deposit payroll checks. Instead of giving a worker a check, the company sends a payroll tape to the bank and the bank deposits the "paycheck" without paperwork.

Individuals can also set up programs that direct banks to automatically pay certain recurring bills—rent, mortgage payments, charge accounts—with no intervention from the customer. The individual sets a maximum payment which the bank can't exceed, and forgets about writing checks for those bills. The bank, in turn, doesn't have to process those checks.

The major problems lie in the large area of outside purchases, though. Point of sale terminals, linked by communications lines to computers, and credit cards, Reed said, can deal with paper profusion in this area.

One Ohio banker described a series of

computer-aided advances. Gordon Jelliffe of the City National Bank of Columbus described the possibility of dealing with these new techniques in four advances:

- Increased computer capability, permitting maintenance of all a customer's records on a single file;
 - On-line entry, for point-of-sale terminals;
 - Automated banking equipment, permitting machines to take over most routine teller functions; and
 - Acceptance of plastic cards—50 million customers now have bank cards, Jelliffe said.
- Automated teller equipment is making possible a new type of branch bank, he said, using drive-up machines. Only two people staff the branch, since, according to City National studies, over 60% of banking functions can be carried on by the drive-up machines—including deposits and cash withdrawals, and transfers between checking, savings, and credit card accounts.

Drive-up check cashing is possible because of a magnetically encoded bank card—as opposed to a credit card—Jelliffe said. The coding contains account number, route and transit number, and bank number. At City National, he noted, only 24% of the customers have bank credit cards, so the bank card is necessary for the automated teller equipment.

He also described an experiment conducted by his bank in a Columbus suburb. About 150,000 customers were given encoded credit cards, and a large number of stores were given point-of-sale terminals, including grocery stores, and even the cashier at City Hall.

The nine month experiment resulted in several conclusions.

- The technology for point-of-sale direct data entry is available now.
- Consumers and merchants will accept on-line sales—with one reservation. Customers were intolerant of waiting very long for credit authorization at the check-out counter, Jelliffe said.

- The system isn't cost effective just on the basis of credit authorization; less than 3% of the authorization requests were rejected. There are other considerations, such as inventory control, that make the system attractive, though, he said.

The bank president also said it is necessary to have a terminal that accepts both bank cards and credit cards, and indicated his bank's use of an as yet-unnamed terminal made by Addressograph-Multigraph seemed likely to fill the bill.

Electronic Clearinghouse

Inter-bank handling of paperless entries—automatic credits and debits for example—is a problem that appears to have been overcome in California. Russell Fenwick of the Bank of America described the recent completion of inter-bank arrangements for dealing with magnetic tape formats, authorization procedures, standards, and legal problems for computerized check clearing. He said the system had just gone live, and processed its first 29 entries.

George W. Mitchell, a governor of the Federal Reserve System, suggested several reasons why progress in this sort of electronic transfer system has been so slow. People's money habits change slowly, Mitchell said, and people haven't been persuaded that electronic banking is to their advantage. He noted that "bankers are generally innovators," and that, since the cost of handling paper is split up between many people, no one group has a profit incentive for pushing for the elimination of paper handling.

Finally, he noted, electronic systems would eliminate "float," the quasi-money that exists between the time a check is deposited in one bank and money is taken out of the check writer's account in another.

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More Secure (But Vulnerable) Systems Expected Soon

By E. Drake Lundell Jr.

ANAHEIM—Today computer users don't understand what they mean by data security, much less how to measure the effectiveness of their security measures. But with research now underway and with combinations of external monitors

Security:

What's Ahead?

and internal controls, users can look forward to "more secure" systems in two to four years, the ACM Special Interest Group on Computer Systems Installation Management has told.

"In data security we are at the stage of trying to define what we mean and find ways of measuring," Donn Parker, session chairman from Stanford Research Institute, said.

There are three different types of security used today, Parker indicated, including organizational security, physical security and internal computer security.

But, he indicated, there is a debate currently on different security styles, including decentralized versus centralized access authorizations, the potential affects of unauthorized access on a firm's assets, and the population of potential system penetration.

External Monitor

There is also a debate over whether computer installations should put their security systems within the main computer in their center or use some sort of external monitor to oversee accesses to the main system and to prevent unauthorized persons from compromising the system.

Jerry Kennedy, president of Bask Computing Arts, described one approach to the separate control, the Data Sentinel system monitor manufactured by his firm.

This system, based around a PDP-11 and Decapets, is located completely separate from the main computer room and attached to a 360/370 by a "tamperproof" cable.

In its present configuration it monitors all incoming requests to access data bases that a firm wishes to keep secure. It stores all of the passwords used in the system, and compares a user's password against a table to determine level of access.

If the user does not have a password that would allow him to access a particular data base or file, his call is terminated.

The system has four basic features, he said, in that it controls authentication of the operating systems and application programs at Initial Program Load, monitors the entire system for requests for data, provides interlock capability, and provides security people and management with reports to help them spot potential penetrators of the system by correlating requests for access.

The unit, he said, does not require any special programming in the host computer, and a security guard can alter the passwords used on-line even while the host computer is in operation.

Confident Users

Phil Martinelli of Crocker National Bank in San Francisco, the first user of the Data Sentinel system, indicated the use of such external monitoring systems made the non-DP people in the company feel the installation was secure.

"The auditors feel comfortable with the external monitoring systems," he said, "because they feel they can keep an eye on the programmers and other DP people."

He also indicated that whoever has the responsibility for overseeing the operation of such an external monitoring system should be outside the DP department.

At the same time, however, he indicated the system did increase the overhead required to operate the main system and that users would have to make that trade-off if they decided to use such a monitor. Robert Abbott of Lawrence Livermore Laboratories stated, however, that such external devices could not really protect a system from the systems programmers who were closely familiar with the operating system used in a computer installation.

Opportunities Exist

"While there are possibilities in such tools," he indicated, there are still many opportunities for programmers to subvert systems."

And he noted that most intercompany theft is performed by personnel with five to 10 years experience with that particular organization—the very people who would be the most likely to be most familiar with the user's operating system and security procedures.

"They also know how you are protect-



Martinelli

Abbott

Parker

"non-DPs feel secure"

"opportunities to subvert"

security arrangement."

ing the system, and so can figure out ways to beat your security arrangement," he stated.

External monitors will not be able to stop this kind of person, he said, even though they do have a place alongside internal security controls in an overall

security arrangement.

In all, Abbott indicated it would be two to four years before we can develop "more secure" systems, but he indicated that even those would be vulnerable to the really talented systems programmer in all likelihood.

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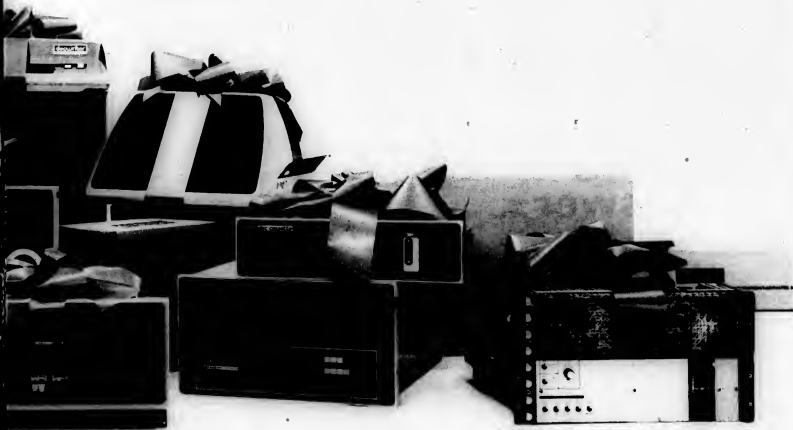
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Despite Decreased Budgets

DP Use in 'Information Centers' Makes Great Strides

By Michael Merritt

Social to Computerworld

ANAHEIM—Despite budget crunches and lack of strong mainframe manufacturer interest, the application of computer to library problems is developing rapidly, in both theoretical and practical ways. This was the overall impression of an FCCU User Application Seminar on Computers in Information Data Centers—or computers in libraries.

The 10 papers presented at the all-day session displayed the depth and breadth of the last 15 years' efforts in analyzing problems connected with using libraries—studies in techniques and methods of indexing and analyzing data, system analysis and system design criteria to maximize end-user effectiveness.

The session also had described a number of working systems which demonstrated the usefulness, problems and cost effectiveness of computerized library functions.

The most comprehensive system described was one now at Stanford University. In its first stages of implementation, it already supports the acquisition and cataloging functions of the university's libraries.

Stanford's Ballots (Bibliographic Automation of Large Library Operations using

to search a file to see whether a requested book is already owned by the library, and provides several different searching indexes—author's name, words in the title, etc.

Hank Epstein of Stanford, another designer, said the system has had an average response time of two to three seconds with 40 to 60 terminals on-line. This is due in good part to the use of programable terminals, which are loaded from a PD-8/9 in which the terminals and the 360, he said.

Design Criteria

Motivating a user to use the system—especially if he is leery of computers—is a major requirement of system design, according to Mary Elizabeth Stevens, a leading theoretician and consultant in the field, formerly of the National Bureau of Standards. Stevens listed a number of desirable ways in which an on-line retrieval system should be responsive to

users:

- The system must be easy to use. The display format must be natural, and the system should use an understandable language or mnemonics, rather than arid numerical codes.

- There should be an easy way to express questions as simple as possible.

- Output should be easy to obtain.

- There should be simple means of inserting and deleting information.

- It should be easy to learn to use the system—and designers should seek to standardize as much as possible languages and control instructions.

There should be user aid facilities—a way to call for help, "please wait" notices during lengthy searches, and status information such as file dates, and the number of other users on the system.

Another important question to the user, Stevens said, is the quality of the file. It is necessary to know if the file is missing, misreading or misspelled data.

Block System

There is a cheap way for libraries to keep a constant, on-line track of where their books are, according to Michael Smith of Bucknell University. His system, Blocs (Bucknell University On-Line Circulation System), uses a combination of CRT and static card reader to put information into a PD-8, which maintains a journal file of outstanding books, as well as hold requests, on a Sykes Datatronic tape cassette drive. The system is also tied into the University's Xerox Sigma 7.

Smith said his staff had done all the programming for the mini-based system, including the writing of an end-user manual. The PD-8, yet total implementation cost for both hardware and software—exclusive of the Sigma 7—was \$68,000. He said operating costs, again exclusive of mainframe charges, were \$8,000 a year.

As well as keeping track of the books, the system permits generation of a number of statistical analyses for management reporting. Checkout breakdowns by time and user classification (undergraduate, graduate, faculty) are possible; one can find out which books individual users have outstanding and see which types of book are in demand.

Smith admitted it would also be possible to find out which books an individual had been reading over a period of time, "if you could get the director of libraries to let you do it."

Minis the Answer?

A library encounters unique difficulties in trying to use a large shared computer, according to Audrey Grosch of the University of Minnesota. The problems she mentioned included:

- Low user priority.
- Excessive core requirements for a multiprocessing environment.
- Requirements for unavailable direct access storage.
- Need for extended character sets on printers.

- Need for on-line data entry.
- Need for frequent batch runs.
- High mass storage costs.
- Poor understanding of library needs by computer center programmers.

Rather than try to contend with these problems in a computer center environment, Grosch said, a team at the Minnesota Bio-Medical Library is now designing a stand-alone system. But rather than use a large-scale computer, with an estimated cost of \$2 million to \$3 million, the Minnesotans are implementing a mini-computer system.

A powerful mini with 12 terminals, 320M bytes of mass storage, tape and printer costs about \$220,000; six of these systems, each serving one local library in the university, would cost about \$1.3 million, and take care of all the university's needs except for the central main library.

(Continued on Page 17)

Looking at Libraries

a Time-Sharing System) is an on-line, interactive system, using Sanders R04 programable CRTs running through a 360/67. In the words of Alan Yeager, one of the designers of the system, it takes care of books from the publisher's warehouse to access by end user.

The system automatically creates purchase orders, catalog card sets, book labels, various file slips and several management reports. It permits an operator

faster than most assembler programs written for general or specific applications.

How much core does Easytrieve require? It requires 24K for DOS and 45K for OS.

How much specialized training do Easytrieve users need? Since Easytrieve has English language statements, non-technical people can perform basic tasks with just a few hours training. Trained programmers need only a brief introduction to Easytrieve's capabilities.

Is Easytrieve available on a free trial basis? Yes. A demonstration, an introductory training session, and 30 day trial are free and without obligation to prospective users.

How does Easytrieve compare in price to packages with similar capabilities? It's about half the price of most comparable packages, yet it has more features and capabilities than many of its higher priced competitors. The single-file-input version sells for \$4,800, while the multi-file-input version sells for \$6,000. Lease arrangements are available for both versions.

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CW-1

DP Solving Library Problems With New Methods

(Continued from Page 16)

This would give the designers an extra \$700,000 to \$1.7 million to spend on software, Grosch indicated.

She mentioned, though, that no mini manufacturer currently provides an acceptable real-time disk operating system, and that the Minnesota team will design its own, though it will use a vendor-supplied system during the first design phases. She said "the real reason" libraries are not now using minicomputers is the need to do their own programming. The Minnesota system will provide all major library functions, including acquisition, accounting, serials control and circulation.

Many Data Bases Available

The session did not confine itself solely to computers in traditional libraries.



Joe Ann Clifton of Litton Industries chairs session.

There was also emphasis on technical libraries and data bases.

The Federal Environmental Protection Agency has several libraries that maintain about 45 computerized data bases on a wide range of environmental, physical, toxicological, chemical and economic matters. Though the data bases are primarily bibliographic, there are also some data bases, such as one on solid waste disposal.

Maintenance, or How Experts Save the Day

By Michael Weinstein

On the CW Staff

ANAHEIM—Most panel sessions on maintenance usually start with lofty pronouncements of the need for better service and end with lengthy talks on how manufacturers get their expert customer engineers to the user's computer and save the day, or equally lengthy discussions of user experiences which generally don't relate to other users.

The FJC session on "Maintenance and System Integrity" was no exception. Bob Fitzsimmons of IBM highlighted the session speaking about IBM's Retain system for providing maintenance for the System 370 user.

Under this system various information clearingshouses are set up across the nation to help the individual customer engineer if he runs into problems. At the base of this service is a data base of all problems reported for all types of IBM 370 equipment.

If a CE reports a symptom, the engineer at the central station can access the data base through keywords and determine whether a similar problem has occurred. If the problem reported is in fact a repeat, a history of all corrective action is available for the CE.

The second feature implemented is ability to hook the failing user's computer to a central system so experts at that center can run diagnostics on-line.

As a third source of information, manuals are recorded on microfiche so that information is easily retrievable.

Of more than passing interest is IBM's passing interest in maintenance for 360 users. When asked whether the same data base and services were being compiled for System 360 users, Fitzsimmons replied that they were but not with the same effort as for the 370 line.

"Our one criterion has been cheap," according to Morton Friedman of the agency's Cincinnati National Environmental Research Center. He detailed the ways the center is able to access such a wide range of information at very low cost—primarily by accessing existing bases on a use-cost basis. His staff of 13 librarians now averages about 20 searches a week, and the rate is increasing. Friedman said. He expects the rate to plateau at about 200 searches a month.

Friedman also mentioned the problems of a young agency just getting started in a new field. "We don't even know to which data bases we want to have access yet," he said.

The data bases are available to the agency and to the agency's contractors, Friedman said.

Software Library

"There is an information gap in software dissemination," according to Robert Panek, who described the computerized file of software routines used at North American Rockwell, NAR, a very large user,

has paid for the writing of many programs, but, due to the size of the organization, existing programs are sometimes recreated because nobody knows an original already exists.

NAR's solution is to use Tips—Technical Information Processing System—according to Panek. Tips maintains a file on some 1,200 scientific software packages indexed by descriptive terms (i.e. Center of Gravity for a program that calculates a center of gravity), author's name, program title, document number, contract number and accession number. These files, compiled from 13 NAR libraries, are available to engineers and managers.

In 15 months' use, Panek said, there have been 12 known usages of programs discovered through the system. He estimated that writing these programs from start would cost over \$40,000.

Auto-Indexing

Stella Kocan, executive director of the

National Federation of Abstracting and Indexing Services, outlined the recent history and current developments in problems of automatic indexing and automatic language processing—enabling a computer to generate indexes from raw input data by itself. She indicated there would soon be a marriage between the efforts of researchers dealing with abstract problems, and actual system users.

She pointed out the costs of getting information from scholarly papers into computers may soon drop drastically due to the increasing use of automated typesetting by journals. The tapes for running typesetting equipment can be read directly by computers, she noted.

This lower cost, coupled with lower hardware costs, spells a radical change in on-line data bases, she said. Rather than maintaining just bibliographic files, it may soon be feasible to maintain files of actual data—texts of papers rather than citations or abstracts. This results in a system that can give answers rather than bibliographies, she said.

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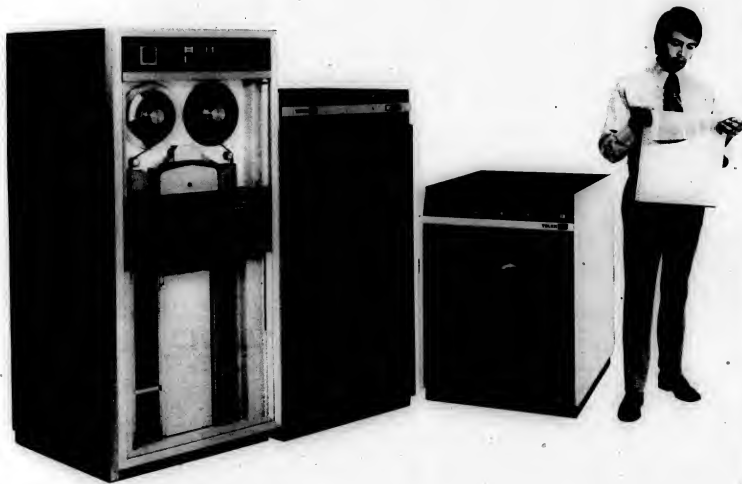
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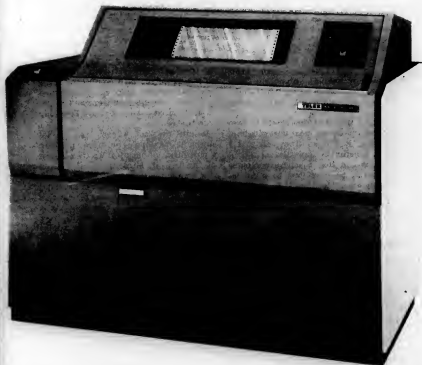
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Editorial

Stalled Satellite

U.S. data users may soon be accessing satellite channels provided by Canada.

This is certainly a commendable display of cooperation with our neighbors to the North. But at the same time it focuses on the regulatory delays and red tape that often seem so insurmountable to the end user.

It is well within the state of current technologies for the U.S. to operate a domestic satellite system. And the economics of such a venture have been adequately determined by current applicants to the Federal Communications Commission. So why the delay?

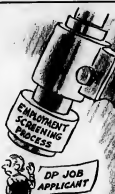
The absurdity of the current situation is clear: we may have to pay foreigners to use a satellite that was launched by our own expertise in Florida.

An operational domestic satellite system to augment existing land-based facilities deserves top priority and an early decision from the FCC.

I SOLEMNLY
SWEAR TO RESPECT
THE PRIVACY
OF ALL
COMPANY DATA.



'Now Repeat After Me...'



Letters to the Editor

English Documentation Should Be Abandoned

Several letters to *Computerworld* over the last two months have advocated scrapping Cobol. The major reasons are that it is verbose, has an irregular syntax and encourages bad programming practice. It is noted that better languages are available.

However, when we examine Cobol within the context of total systems, it is obvious that the costs of writing Cobol source code, as well as the volume of language produced, are insignificant for normal-sized projects.

The real culprit is English used in feasibility studies, functional descriptions, programming specifications, program annotations, users' guides and operations manuals.

Why should we continue to use English with its irregular grammar and inconsistent orthography? English encourages ambiguity and other bad linguistic practice.

Since Esperanto can be demonstrated to be sufficient for technical documentation, doesn't it make sense to abandon English for documenting all new development? (It could, of course, be retained in our inventory for a few years for existing systems.)

If the Federal Government merely stops insisting that its documentation be in English and if minimal effort is devoted to Esperanto standardization, the rationale for English will disappear.

Obviously, a programmer/analyst who lacks the intellectual capacity to master more than one documentation language has no more place in our field than the person who knows only Cobol as a programming language.

James J. Pottinger

Arlington, Va.

Standardized Assembly Would Help But...

Re: Thomas K. Tate's letter in the Nov. 22 issue - standardized assembly language as a Cobol replacement.

While I grant that a standardized assembler would be a great help in building up libraries and is something that should be done, I have the following objection to making it a Cobol replacement language:

- Assembly languages are very machine-tied by their nature. Direct interchange is almost impossible between two machines with different word size, different firmware, etc. without very fancy microprograms. If you are going to have that kind

of thing, why not use compilers?

- Improvements in a single machine would mean redoing the library. For example, if my computer gets multiply-divide circuit boards for Christmas, I have to go through the assembler library and rewrite those parts of my program that have the software routines for those functions (and look for side effects from the changes). Or I can write a routine that will edit the library for me - another simple compiler-like device.

The same thing may be said about new storage devices and their write routines, etc.

Yet, with a high-level language, I just change the compiler and let the machine take care of what needs doing.

- High-level languages can optimize code with more care than a human can. The committees that put together some compilers had specialists to work on the best way to handle arrays, lists, etc. I don't feel you should expect one man to have a Master's thesis-level knowledge in all areas of information science before you let him write a program.

- We are getting better programmers today. High school kids in introductory classes are getting terminal experience in many places in this country. You can reasonably expect that within five years or so the novice programmer will be able to use and understand very sophisticated high-level languages - having worked with them since age 15.

You can also expect that machine-time costs will go down as technology advances. This means that the high-level languages could actually be cheaper to use (machine time vs. people time) and could be as good as or better than the average assembly language program.

Joe Celko

Atlanta, Ga.

Arena Scheduling Requires Too Much Student Time

Alan Taylor's article on Arena scheduling (CW, Nov. 15) covered many of the potential advantages of a technique for scheduling students to specific classrooms. In my opinion, Arena scheduling has some real advantages, but it is unfair to leave the impression that this technique is an unmixed blessing.

My primary objection to this type of scheduling is that it requires a large amount of time by students and staff to accomplish scheduling. This time comes out of the approximately 180 days of education in the academic year.

Too much time is being subtracted from education today in the form of half

days, student assemblies, review of material previously covered, and the like.

- Further objections include:
 - Balancing of course sections is uncontrolled. Does better education result from having 30 students per class for popular teachers and 10 students per class for unpopular teachers?

- Any student scheduled later in the process receives far fewer opportunities than a student scheduled earlier. Is this really democratic?

- Today's sophisticated computer-scheduling techniques permit special choices, such as scheduling a student's part-time job, so Arena scheduling is unnecessary for this purpose.

- Arena scheduling does not overcome the fact that some teachers are unpopular; it only requires that they carry a lighter workload than popular teachers.

A correction of the tenure system and/or introduction of a merit system is more likely to "correct" the problem of unpopular teachers. Moreover, having been a student, too, I recognize that a popular teacher may well earn his reputation by grading easier and assigning light assignments in addition to being an outstanding pedagogue.

- Most, if not all, of the alleged benefits of Arena scheduling are possible with today's conventional computer-scheduling techniques without the chaos and time loss implied by the "mad scramble," which I, along with Alan Taylor, envision.

Perhaps I should confess a bias or two. Our company does a great deal of school scheduling. It follows from this that I discern benefits in sophisticated school scheduling and that I believe computer systems can be developed to make increasingly wiser "decisions."

David W. Chaffin

President

Applied Data Processing
North Haven, Conn.

Looking Backward?

The article by Alan Taylor entitled "Scheduling Systems Did Less Work, Had Better Results" (CW, Nov. 15) was confusing and impressive.

Arena scheduling is over 20 years old. It does not depend on the computer. Arena types of scheduling systems were originally designed for EAM equipment.

There are certainly many systems that combine the advantages of Arena scheduling with computer efficiency. An endorsement of Arena scheduling by Taylor will, I hope, not lead us back in time rather than proceeding toward more flexi-

ble, effective methods of scheduling.

Joseph A. Domar

Assistant Director

University of Minnesota
Minneapolis, Minnesota

Independent in Canada

Re: Random Notes (CW, Nov. 8).

Data Logic Canada Ltd. provides Mark IV service as a completely independent Canadian company which has purchased two Mark IV service franchises.

Although Data Logic offers parallel Mark IV services in Canada, it is not in any way an agent of Informatics; rather, we are keen competitors for the rapidly growing Canadian market for Mark IV education, processing and control programming services.

J.R. Edmondson

President

Data Logic Canada Ltd.
Ottawa, Ontario

A DP'er in Politics?

The Nov. 15 issue of *Computerworld* contained an article on "System Analyst Loses as 'DP Candidate,'" datelined Redford, Ill.

Please! We have had enough time with our state highway department - it refuses to put us on the map because we are a township rather than an incorporated city. But, you did even worse - you put us in the wrong state! Redford Township is in Michigan.

Despite the fact we are over 75,000 strong in our population, we do not have a post office of our own. We are a branch of the Detroit, Mich., post office. And this despite the fact that if we were a city we would be the 15th largest in the state!

As far as Ralph Judd losing the election to Martha Griffiths, I can only say a computer man does not necessarily make a good politician. And what an asinine platform to use: "Put someone in Congress who knows computers." There certainly must be more to being a representative than that!

It is also interesting to note that Judd was stated to be a certified data processor, system analyst - yet he is not on the latest rolls of the local DPMA chapter. I know he does not have to belong to DPMA to receive the CDP - but my question remains: "Does he hold the CDP Certificate?" He did not use capitalized words in his reports, so if he is not a CDP, then he should not imply that he is.

James E. Taylor

Redford Township, Mich.

Attack on SDE Certification May Have Backfired

"Have you seen and taken the (Society of Data Educators') examination for the Certificate in Data Education (CDE)? I took the first one and found it bad in several respects. Types were prevalent."

Some questions tested knowledge of particular computers and operating systems (IBM). The author understood neither difficulty nor discrimination indices. Little normative data is available for the examination.

"Also, you might like to look at 'Data Education,' the society's journal. I doubt it will meet your standards."

"Enclosed is a copy of the first CDE examination together with my comments."

The above statement came from an individual connected with the CDP certification program (and who asked not to be identified). The statement came to me after I had reported on the SDE's CDE certification, and how it offers an alternative style of certification to the CDP certification and university-style examinations.

Basic Concepts

The CDE is based on the concept that practitioners are entitled to certification if they cannot be proven ignorant or dangerous, while university exams and CDP exams are based more on the concept that no one should be allowed to take an examination for some arbitrary long period.

This individual, whom I'll call Mr. X, is connected with the CDP examination, and was apparently writing in defense of its particular operation, and only doing so indirectly by attacking the opposition rather than by showing the strengths of the CDP exam.

Nor did Mr. X contradict my discussion of the differences in the two examination philosophies. Because his charges are interesting, it would be worthwhile to look at them.

Charges Examined

"I took the first one and found it bad in several respects."

Perhaps so—but why object without checking up on the latest situation? Should we judge the Registered Business Programmer Examination by the fiascos involved in its debut? Or the 1972 CDP by the 1962 original? Mr. X, I am sure, would be the first person to object to such a method of operation. Why then should he use such an attack? I don't know—but let us see what further detail he has to back up his description of the exam.

"Types were prevalent."

This certainly was unfortunate—but it happens in the best examinations. It can easily be remedied, so I am not too worried about it when considering the alternative examination philosophies. I would be worried if I were considering the results of a specific examination, but that is not what is being considered.

"Some questions tested knowledge of particular computers and operating systems (IBM)." What? Is this a criticism? Would Mr. X suggest that knowledge of the major business computer systems is inappropriate for prospective DP teachers? Mr. X may be prepared to approve teaching by ignorant "experts."

I think that what Mr. X has done here is to forget that the CDE examination is not the CDP examination. It checks out DP teachers, not practitioners. A practitioner can be well-qualified to practice DP without necessary knowledge of IBM equipment; however, the teacher had better know something about the IBM line so he can talk with his students.

Of course, Mr. X may be trying to react to my reputed anti-IBM attitude. Sorry, but I want quality, real education, not the kind of false education of IBM.

Does Author Understand?

"The author understood neither difficulty nor discrimination indices."

How awful—if I truly I wonder if Mr. X knows the author? I wonder what evidence he has to offer? He gives none in his letter, or in the 13 pages of attachments, all of which I have gone through carefully.

More importantly, however—before giving employment to some of our more academic educators—does Mr. X suggest whether these measures of some type examinations are important to this type of examination—a floor-level certification examination for a DP teacher already in practice?

That is the key question—and I know of no reason to suspect that any such validity has yet been established. When it has been, I have no doubt whatsoever that the Society of Data Educators will be happy to collaborate and produce an examination whose grading can be so measured. Until then, however, I cannot see that Mr. X has done anything to prove the examination faulty.

Incidentally, although not being an educator specializing in the evaluation of examinations, I do question whether there have been some serious objections raised to the reliance on the use of such validation techniques.

Little Data Available

"Little normative data is available for the examination." Very interesting. But still less is available for the older CDP examination. True, members of the Certification Council may receive long tabulations of difficulty and discrimination data—but these do not include the absolute validity data nor are they available for outside study and comment. The charge may be valid—but it seems to be best a case of the "pot calling the kettle black!"

SDE Journal up to Standard?

After his attack on the SDE examination, which only proves the absolute necessity of encouraging alternative forms of certification (as well as those like the CDP), Mr. X changes targets, and brings up Data Education.

I had mentioned the publication, in my original article,

noting that the SDE does at least on CDE applicants—at least taking Data Education for a year, and so does help to encourage them to stay up-to-date in their field.

(By contrast, the CDP authorities make no such effort, unless one includes releasing lists of CDP holders to local DPMA chapters as possible new member sources, thus "encouraging up-to-dateness.")

"Also you might like to look at Data Education, the society's journal. I doubt it will meet your standards."

I notice the implication that I had not looked at Data Education—apparently because I had not found it necessary to men-

"Attacks like this one on the SDE certification method reveal more about the weakness of the certification methods Mr. X is connected with than they do about the weaknesses of the alternative SDE-style of practitioner certification."

tion anything about such an investigation when talking about education, new members, or to disappoint you, Mr. X—I had done my homework before I wrote.

But, just to convince myself, I have just taken from my files a randomly chosen Data Education copy. It happens to be fairly recent, but not the latest by any means. It's the issue of March 1972. Let us go over the contents together so we can see just what that comment about the annual standards really means. Data Education, one must understand from the start, is for the practicing DP teacher. What interests us as DP professionals is whether the journal helps DP teachers keep up to date.

The first article in the journal is a feature on Ajax High School in Toronto. This school is representative of a spreading educational philosophy—allowing students to pick their own courses.

The article shows that in such circumstances the computer can carry out a double role: helping with the increased administrative chores, as well as being available for use in the DP classroom.

The article gives a nice case history which can be used to justify the expansion or initiation of a computer curriculum. I give the editor of Data Education 10 points out of 10 for including the article.

Then a Professor Featheringham, of Central Michigan University discusses the comparative merits of programmed instruction, computer-aided instruction and learner-controlled instruction for the separate disciplines of console operator, programmer and systems analyst training.

Here we have some excellent pointers as to when not to use some techniques, and a real recognition that training for a console operator is not a subset of training for a programmer.

I wish that the DPMA/Certification Council would take some of these truths to heart when it designs study guides for the RBP and CDP examinations. Again, the editors get 10 points out of 10.

The rest of the journal is equally interesting—a staff account of the Soft Copy Conference and Workshop; a report

on a study in Groton, N.Y., which showed that justification for a degree in a DP program was not to be found in the local business needs; a 20-frame extract from a flowcharting exercise; a 14-page directory of firms for DP education, and so on.

DP Education Concentration

Well, Mr. X? What is not up to my standards there? Perhaps you think that some of the material is not advanced enough? Not dealing with the future of virtual distributed machines? Or the functions of Codepays?

True, I would like to see some of this in DP education—but I can hardly ask the editors to concentrate upon my specialty

rather than concentrate on their own—which is DP education, not console processing!

Perhaps Mr. X feels the production standards of the journal are not high enough? With the development of the new society offices under Art Pike in Northfield Vt., production standards have improved considerably. The four-color covers—no looking better as each issue comes off the press. And for \$9/yr to non-SDE members—free as part of the annual \$12 dues to members. I think the journal is a bargain.

I value your interest, Mr. X.

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Special Services Increasing

ANAHEIM—Some users of computerized medical systems in Orange County, Calif., have gone beyond patient care systems and are providing some special community services.

Gerald C. Brady, analyst programmer in the Department of Medicine at the University of California, Irvine (UCI), told a special panel on medicine and health of a computerized research project in the cardiac-pulmonary section to help return to work people who have suffered a heart attack.

Brady described a stress evaluation unit which uses a minicomputer to evaluate six patient functions.

For example, a computerized walking machine is used which makes walking increasingly difficult for the patient and measures his energy output.

Brady also told of equipment the released patient carries with him to monitor his heart activity, and the data is then evaluated by a computer.

He said future projects include working with the orthopedics section of the

Department of Medicine to compare patient activity before and after hip and knee surgery.

Sue Ungerman, moderator for the panel and biostatistician for regional medical programs at UCI, reported on an automated stroke registry that led to the discovery of the deterioration of stroke patients after they were released from the hospital. As a result, volunteers were recruited to help the stroke victims.

She also told of resource agencies for the community listed on a computer to facilitate responses to inquiries from people in the community seeking help.

Donald A. Dennis, coordinator of medical education at St. Joseph's Hospital, Orange, told of an effort to analyze patterns of patient care by computer.

Meetings are held with the physician at the office to teach him how to analyze his own practice with his own data.

Medical Applications Range From Prevention to Discharge

By Marvin Smallheiser
CW Correspondent

ANAHEIM—Four computerized medical applications ranging from preventive medicine to a shock therapy system for patient discharge summaries were presented at an FJCC technical seminar on health and medicine.

An award-winning program called Prospective Medicine designed to identify potential health dangers before they actually become problems was presented by Dr. Charles Ross, president of Interhealth, San Diego.

The Prospective Medicine program is based on information gathered about the history of a disease, its thrust, its starting point, and the risk of death to a particular person based on personal characteristics and habits.

Ross said the program takes any kind of input, analyzes the various factors and suggests intervention procedures to prevent a disease before it occurs.

Dr. Norman Neches of Maimonides Medical Center, Brooklyn, N.Y., told of a pilot, off-line system based on a series of computer programs to create, store and retrieve patient discharge summaries.

"The system can produce periodic reports for the evaluation of the experience of any specific clinical department. A breakdown of the type of patient seen, the number of admissions and discharges, average length of stay, a compendium of all diagnoses, medical and surgical procedures and complications seen during the time period may all be obtained easily, he said.

Dr. William Hetvey of Technicon Corp., Mountain View, Calif., told of Medical Information System I, a system now fully operational at El Camino Hospital, Mountain View. The system puts the entire contents of a hospital on a computerized patient-care system.

The MIS I utilizes 54 video terminals with light pens, and about 25 electrostatic printers in the hospital, all connected to a 370/145 with seven disk drives located three miles away.

Patient security is protected, he said, by a private code which gives physicians access to information. It is set up to allow other personnel to get limited information appropriate to their tasks.

Howard Carrington of the Center for the Critically Ill, Hollywood Presbyterian Hospital, Los Angeles, described developmental research under way at a two-bed shock therapy installation that is fully computerized.

Systems Vendors Must Educate Users

Special to Computerworld

ANAHEIM—If the computer is to penetrate the medical world to the benefit of the user and the patient, the industry will have to embark on a market development program that will educate the user, according to Dr. Michael A. Jenkins of the Computer Medicine Department of the Office of the U.S. Surgeon General.

In a keynote address at the opening session of the day-long conference on Computers in Medicine, Jenkins urged data processors to make a stronger effort to educate hospital personnel and maintain a dialogue with them.

Jenkins, who is president of the Society of Computer Medicine, said the computer vendors should not go through repeated "show and tell" routines. "What is needed is critical analyses of what is good and bad about a system."

Computer penetration in the medicine and health fields, he said, has been "almost negligible" and he claimed the reason for the limited use is that buying units have not been defined.

Hospital Problems 'Underestimated'

Special to Computerworld

ANAHEIM—The data processing professional who has tried to serve hospitals has "uttered the field with broken promises" because he underestimated the scope of the problem and he is still making the same mistake.

This was the consensus of a panel on hospital data processing at which data processors were urged to "find out what is going on in the hospital."

Gene E. Thompson, panel moderator and chief of hospital information systems, Department of Hospitals, Los Angeles County, said there was a "lack of meaningful communication with doctors and nurses."

Mark Burstein, chief systems analyst for California Health Data System Administrators, presented the other side of the picture: "Hospitals don't understand what is necessary or involved. They want to overlay the data processing system over the manual system."

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On Designing Supercomputers

Careful Algorithm Analysis Can Mean Better Machines

By a CW Staff Writer

ANAHEIM, Calif. — Computer designers "could produce supercomputers which are much more effective than present machines" by doing careful analysis of users' algorithms, David Kuck of the University of Illinois told an FCC session on "Supercomputers."

By designing such supercomputers with the user's problems and operating procedures clearly in mind, the computer designer could build systems that were the biggest and fastest and most complex available and at the same time make them useable by ordinary users without extensive hardware and software backgrounds, Kuck indicated.

"It is also the designer's responsibility to consider new uses for machines, particularly in the non-numerical file-processing area," Kuck said, indicating this would "make the benefits of supercomputers more directly available to ordi-

nary users."

Kuck said that even though many designers will push one configuration or method of operation as the "best way" to design all systems, "clearly there are many different computer/software configurations extant which serve quite different sets of users in reasonably acceptable ways."

Software Layers

The problems with today's system, Kuck indicated, include "too many layers of software being used in an attempt to make general-purpose computers appear as a variety of special-purpose machines. 'If steps were taken to automate the design of entire computer systems,' he added, 'then it should be possible to incorporate these users' needs by analysis of algorithms they wish to run.'"

To reach the ideal goal, Kuck outlined what he felt were the computer designer's

goals and responsibilities.

These included a reduction in the use of high-cost components and subsystems in a machine while increasing the use of low-cost components and maximizing the data flow rates throughout a system by introducing concurrency into the designs.

In addition, Kuck said designers should measure user algorithms to determine system design and make all machines "extendable in their capabilities."

Kuck also stated the designer of computer systems should "incorporate new processing features into hardware to replace programs," another move that would make user systems easy to use by the average potential user.

At the same time, Kuck admitted "it is very easy (and hence quite common) for university professors to go around waving their arms and pontificating about how things should be."

"Every sensible computer person

knows it is not such people who determine what machines will come into common use, but rather market forces which do."

Because of this, he said, "paper and real machines conceived in universities, by users, and even in the back rooms of computer manufacturing establishments, are ignored."

He also noted a trend toward consolidation in the mainframe area and suggested that if this trend continues, the result could actually be less innovation than is now evident.

To overcome this, he said, there was a need for active consumerism on the part of the people who design computer systems.

"Perhaps the knowledgeable current users can clarify their demands and make them felt. Maybe even the masses of potential ordinary users will realize what computers could mean to themselves and press for the commercial availability of such computer services."

But if these moves on the part of designers and users fail in getting production of better and more cost-effective systems, then innovation in the business will be held back for decades to come, he concluded.

Simulation or Math Modeling? Perhaps A Mix Is the Best

By Edward J. Bride

Of the CW Staff

ANAHEIM — Why simulation? Computer designers, engineers and users held a two-hour debate on the merits of simulation vs. mathematical modeling at the FCC, but the results were inconclusive.

Simulation provides a good way to predict a system's performance, most agreed, although a mix of simulation and mathematical modeling was recommended.

Thomas E. Bell of the Rand Corp. noted simulation does help predict when poor response will be introduced into a system, such as when too many I/O devices are added. It can also predict such things as message delays, lost data or the unresponsiveness of a system.

On the other hand, Alfred DeCegama advocated the use of mathematical models where more than four programs were being processed simultaneously. The NCR engineer suggested mathematical models are much faster than simulation, although he did concede that simulation is cheaper and faster to develop.

Anyone interested in predicting system performance, he noted, should assess just how many times the measurement would be needed, and then choose — most likely — a mix of simulation and mathematical modeling as the more efficient approach.

While the audience was divided on which approach was better, session moderator Philip J. Kiviat, who is with the Federal ADP Simulation Center, noted models can use feedback from measurement devices, whereas simulation can not.

People interested in simulation can help in systems design, Kiviat commented, noting these people cannot help control systems through the method they advocate.

"We must close the loop," he said, "by taking measurements, and using them to control the system."

"Simulation is not useful here, but measurement can be used to feed back to mathematical models," he proposed.

Bell said that if simulation is chosen, then users must adhere to a set of rules headed by stating objectives of the simulation project — in writing. Then, consistency must be checked before design is continued.

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Interest Reports Merged; Forms, Print Time Saved

COLUMBIA, Md. — Production of year-end federal and state forms has been simplified for 360-based bank DP centers handling savings accounting applications, with the combined Interest Reporting System (IRS) software from the Disc Division of Hittman Associates Inc.

The system is said to meet the latest reporting requirements of the Internal Revenue Service while eliminating redundant paperwork. It reports all related accounts on a single 1099 or 1087 form, but provides enough detail about each account so the customer can separate the data for his own tax-reporting purposes, the company said.

The system extracts interest and account information from a wide variety of user record formats, without requiring any sort of conversion run.

The data is brought together on a single new file used directly to produce the multi-account 1099 or 1087 forms, but which is also then available as an in-

quiry or reporting data base in its own right.

Tapes Generated

In addition to reducing the number of individual forms to be prepared, the software also generates tapes to Internal Revenue Service and state tax agency standards, and provides the bank itself with interest reports by branch and by type of account.

Said to handle the entire process from reading and analysis of the diverse input files to printing of the 1099 and 1087 forms in a single pass, the software is currently operational in an OS/360 environment, in an 80K to 120K partition.

Written largely in Cobol, it is being adapted to DOS/360, where it is expected to function in 64K, and to Burroughs B3500 configurations.

The package sells for \$7,500 including source code and installation support, and can be ordered from Disc at 9190 Red Branch Road, 21045.

Accounts Run in T/S Mode

CHICAGO — Midwestern firms anticipating a need for DP capabilities, but fearing the cost of in-house installations, can get four primary accounting functions handled through the Remote Computing/Billing, Accounts Receivable, Sales Analysis and Inventory Control (RC/BASIC) services of ISC/Pryor Computer.

In the billing operation, RC/BASIC edits input data and computes all pricing, including extensions of unit prices and the application of various discounts, and sales taxes as appropriate.

The accounts receivable provides monthly statements that show balance forward, current month's detailed activity, payments received, service charges and balance due.

The statements indicate aged amounts past due, through 30,

60- and 90-days. The same data is summarized by account on a report for management.

The sales analysis is particularly useful to distributors, ISC/Pryor said, since it can show monthly sales by manufacturer and location. Sales lost reports and 12-month sales histories by item and location are also generated by the system.

The inventory control system supports users inquiry so decisions can be made based on current information.

There is a "fitting charge" to adapt the standard RC/BASIC programs to a user's needs, and this one-time cost may vary from \$500 to \$3,000. Beyond that, the user is charged only for the time he uses the system.

ISC/Pryor Computer is at 400 N. Michigan Ave., 60611.

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COMMUNICATIONS

Data Briefs

Terminal Interface Samples Up to 128 Analog Inputs

IRVINE, Calif. — The SRC Division of Moxon Inc. has an Astrowriter data terminal interface to RS 232-compatible serial ASCII code.

The interface can sample outputs from up to 128 channels of analog data and generate a digital output compatible with mag tape systems, TTYs, CRTs and data sets, the company said.

The system includes up to five plug-in circuit cards. Remote control and time code insertion features are optional. The basic system, which can operate at switch-selectable speeds of 110, 115, or 300/bits sec, costs \$770. Moxon is at 2222 Michelson Drive, 92664.

Plotter Handles Terminals

LYFAYETTE, Calif. — Zeta Research Corp. has introduced a remote digital plotter that can operate at 810 steps/sec. The System 3630 plotter interfaces with remote terminals operating at 10, 14.8, 15 and 30 char./sec, and it includes a 34-in. drum which uses conventional rolled plotting paper. Total plotting area equals 34 in. by 120 ft, the company said.

The 3630 is supported by compatible software for major time-sharing services and CPUs, and it includes EIA RS 232-compatible interface software. The 3630 costs start at \$17,500. Zeta is at 1034 Stuart St., 94549.

NCR Adds Tape Unit

DAYTON, Ohio — NCR has introduced a paper tape transmitting unit which contains a built-in modem. Designed to handle any 5- to 8-bit data rate, the 760-328 can transmit at 72 char./sec over dial-up lines.

The paper tape transmitter costs \$1,675 or \$70/mo. An associated paper tape reader with an increased paper capacity of 1,500 ft sells for \$165 or \$28/mo, the company said.

CPI Builds Texas Net

DALLAS — Communications Properties Inc. will soon begin construction of a 775-mile microwave system connecting seven cities in Texas.

Designed to handle data communications and other types of transmissions, the net will include 31 microwave sites connecting Dallas, Austin, San Antonio, Corpus Christi, Houston, and Beaumont. The company is one of the specialized common carriers which will provide selected services to data and other users.

Channels Next Year?

Canadian Satellite Could Serve U.S.

By Ronald A. Frank

Of the countries that could serve the U.S. with satellite channels, Canada — U.S. communications users might be using domestic satellite channels by the middle of 1973, if current Canadian plans materialize.

Canada's first domestic satellite, Anik 1, was successfully launched on Nov. 9 and will begin service to Canadian users in January. The Anik 1 orbit also covers the northern two-thirds of the U.S. and could provide service to U.S. users.

The Canadian satellite, though launched from Cape Kennedy by the National Aeronautics and Space Administration, is controlled by Telesat which is jointly owned

by the Canadian Government and the country's common carriers.

At present the company is chartered to provide services only within Canada. But the necessary "revised letters patent" has been filed with Parliament, which if ratified will allow non-Canadian use of Telesat facilities.

If Telesat gets Canadian Government approval, by the spring of 1973, as expected by Canadian sources, additional authorizations would have to be given by the Federal Communications Commission. Domestic U.S. service using Anik 1 would depend on the construction of U.S. Earth stations.

Domestic satellite system applications, presently pending before the FCC, include ground stations which could be built and used temporarily until a domestic satellite is launched and in service, according to a U.S. Government source.

One satellite consultant estimated the necessary ground stations could be built in three to six months at a cost of \$100,000 to \$250,000 each. The Anik "beam" probably could serve U.S. customers from the Canadian border southward to a line running roughly from San Francisco to just north of Washington, D.C.

Pending a change in Telesat's authority by Canada's Parliament, it is not known exactly how U.S. users would access Anik 1 channels. But officials in both countries seem to favor bringing the satellite channels to U.S. common carriers who in turn would supply them to their customers.

Rates and facilities for Earth stations on Anik 1 would have to be decided between Telesat and the U.S. common carriers.

The satellite channels would probably serve data as well as other users, according to one FCC source. But exact allocation of available satellite facilities would probably be determined by the U.S. common carriers, he said.

Digital Met in 1973

If all digital facilities were provided between users' sites and the satellite ground stations, data users could have a digital network operating next year, the satellite consultant said. U.S. carriers have not yet commented on the use of Canadian satellite channels.

With FCC approval, the first U.S. satellite system could be in operation by January 1975, the consultant estimated. Both U.S. and Canadian authorities noted U.S. use of the Anik 1 facilities will be strictly an interim step to provide U.S. channels until a domestic satellite is available.

Letters approving the satellite usage in principle have been exchanged between the State Department and the Canadian Government, a U.S. source said.

Regulatory Processes Demand Public Confidence, DeButts Claims

NEW YORK — For most Americans, the functions of regulatory agencies "are mystery wrapped in an enigma," according to John D. DeButts, AT&T's chairman of the board.

Speaking at a recent meeting of the Economic Club, DeButts said, "Only with public understanding of the issues and public confidence in the process by which the issues are resolved can regulation gain the public consent."

"What is needed is a climate of public opinion that is not dominated by a few individuals or by a few groups with their own set of goals."

Telephone rates are rising "somewhat faster than the Consumer Price Index," DeButts said. "The public couldn't have chosen a worse time for this to happen," he added, citing public impatience with rising prices and a "national policy to halt inflation."

The telephone companies have been

"traditionally disinclined to try our rates in the press," to avoid influencing the regulatory process, DeButts said. But at the same time the phone companies should not "neglect to inform the public of its stake in these matters," he said.

Press coverage of regulatory matters with few exceptions has been sporadic and superficial, DeButts claimed. One of the consequences is that "the public is very largely unaware of how significantly the regulatory process may be influenced by [regulatory] agencies' staff employees." The regulatory staff members, after facing adversaries in the hearing room, "are then called upon to 'assist in writing the decision,'" DeButts said.

"If there is a conspiracy that shields the regulatory process from public view, it is not a conspiracy of secrecy," DeButts said, "rather it is a conspiracy of complexity."

Regulatory decisions that are declared to be in the public interest are made without the benefit of public opinion, DeButts charged. "It is the public who will bear the consequences of these decisions and it is the public who will pay the price," DeButts said.

Raytheon Display Has IBM Emulators

NORWOOD, Mass. — Raytheon Data Systems has a program called CRT to mimic a terminal system that includes features available with IBM 2260 and 3270 systems.

The PTS-100 CRT system can interface with IBM 360/370s and includes as standard features a tab capability, printer support and non-destructive cursor.

For use in local mode or through communications lines, the CRT has an MOS memory that is expandable from 8K to 64K bytes. The display is available with 480, 960 or 1,920-character screen capacities with 67- or 82-key keyboards.

The Raytheon emulator software for 2260 or 3270 operation includes user training and maintenance.

The PTS-100 costs about \$6,050 for a two-display system or about \$370/mo. The company is at 1415 Boston-Providence Tpke., 02062.

AT&T Files 208 Rate

WASHINGTON, D.C. — AT&T has filed an interstate tariff for its 208 data set which operates at 4,800 bit/sec. The proposed charges would cost users \$125/mo with an installation fee of \$150. The tariff, if approved by the FCC, would take effect Dec. 24.

The proposed interstate monthly rate for the 208 is \$114 more than the highest interstate rate now being charged by Bell operating companies. Usually Bell interstate rates are lower than interstate charges, one source said. Seven states have already set rates for the 208, according to an AT&T

spokesman, with the highest charges applied to Illinois users. In that state the modern costs \$111/mo with an installation fee of \$150, the spokesman said.

In South Carolina, Iowa, Minnesota and Wisconsin local phone companies have set \$100 for the monthly rate and a \$100 installation charge. In Michigan the monthly charge for 208 while installation is only \$25, the AT&T spokesman said. In California the rate is \$100/mo with an installation charge of \$150, AT&T said.

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Data Users Spend 50% on Lines

NEW YORK—The average data communications user spends 50% of his budget on lines, 35% on hardware and 15% on his staff and overhead, according to a recent study by the Diebold Group Inc.

Data communications will become more integrated into the total business area and the DP executive will have to consider voice, data and message planning, the report said. At present, data communications represents about 8% of the DP budget for average users, the report said.

The Diebold Research Program study of more than 200 of the largest U.S. corporations showed

that firms are expanding their DP technologies "to physically remote portions of a company's operations." While up to now data communications has been used primarily to transmit information to top management, it is also becoming more "interactive to increase worker productivity."

Communications growth will expand rather than explode within the next three years for most users, the report predicted. Since data communications networks support business activity, management must be involved in the communications decision-making process, the

study noted.

Many users find implementation of a communications system difficult. In addition to regulatory considerations, users have trouble designing their systems and selecting their suppliers, the study added.

Users should select terminals according to their functions, the report advised, adding that users should not alter their system objectives to suit particular equipment. Independent suppliers of terminals, multiplexers, concentrators and similar equipment can provide "superior cost-effectiveness compared to main-frame vendors' products."

In configuring a network, users should also utilize "automated analytical tools" to evaluate alternatives and optimize their networks. Diebold is at 430 Park Ave., 10022.

2750 PBX Unit Installed

MECHANICSBURG, Pa.—IBM has installed one of its 2750 computerized PBX systems at the field-engineering distributing center here. The system is available only through World Trade, outside of the U.S. The 2750 "was installed as part of the evaluation of the product" and it is not unusual for IBM to take advantage of products available within the corporation, an IBM spokesman said.

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international information processing network linking over 250 locations in North America and Europe.

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HUDSON, N.J.—An 80 char./line matrix impact printer, operating at 100 char./sec and 60 full line/min is available from Centronics Data Computer Corp. for \$1,995.

The Model 306 uses a 5 by 7 dot matrix and can produce up to four carbon copies, the firm said.

Various character sets are available and can be expanded up to 128 characters as an option. This feature allows output to be printed in up to 17 different languages, the firm said.

User applications include hard copy output, time-sharing use and communications applications. Delivery is 30 days from One Wall St., 03051.

Source Record Punch Performs Simultaneous Operations

DAYTON, Ohio—The Model 1740 Source Record Punch (SRP) can be programmed to receive and organize information at the same time it is preparing printed or punched output, according to Standard Record Co.

The Model 1740 can accept information from various sources including its keyboard and internal slide switches.

The units are priced at \$4,150, or \$175 on a monthly rental basis with an option to buy from the firm at 62B Albany St., 04508.

Industrial Control Mini Offered

PRINCETON, N.J.—A \$30,000 mini-computer and software system designed for industrial control operations is available from Metromation, Inc.

The Basic Control System (BCS) hardware includes a CPU with core memory, process I/O, teletypewriter and console. The system is available in either core only or core-disk configuration, the firm stated.

A system with 16K words of core storage and 1.2M word disk sells for around \$50,000, an all-core system with 16K word capacity sells for around \$30,000.

In operation, the BCS controls real-time input devices using a multiprogramming monitor and a Basic language interpreter. The firm is at 1101 State Road, 08540.

Add-Ons Available to Sigma Users

VAN NUYS, Calif.—Sigma 5 and 7 users can add on semiconductor memory system from Signal Galaxies Inc. The Model SG-57 is fully hardware and software compatible and cables directly to the Sigma memory bus, the firm stated.

Operating cycle time is said to be 650 to 750 nsec, depending on mode of operation.

Field expansion is possible through plug-in memory cards in 4K increments up to 16K, and all units come with an off-line simulator test system. Each memory bank may be expanded with up to 16 ports.

The basic 4K system costs \$16,000 and a full 16K memory bank sells for \$25,000. All units carry a one-year warranty from 6955 Havenhurst Ave., 91406.

Debug Unit Made for PDP/8 Users

PISCATAWAY, N.J.—PDP-8/E users can debug programs by halting execution at selected memory locations with the CES 110A Hardware Breakpoint Module from Computer Interface Systems, Inc. The unit consists of a switch panel assembly, cable-connected to a printed circuit board which plugs directly into any Omnibus slot.

The \$485 module is available through Box 58, 08854.

Users Can Write Their Own Microprograms

LONDON, England—Recent advances in microprogramming techniques allow the user of a Hewlett-Packard 2100 minicomputer—or any similarly designed machine—to tailor new instructions for his CPU, according to John Page, senior systems analyst for Hewlett-Packard.

In operation, this means the user can extend the microprogram to include instructions for his CPU, according to John Page, senior systems analyst for Hewlett-Packard.

In operation, this means the user can extend the microprogram to include instructions for his CPU, according to John Page, senior systems analyst for Hewlett-Packard.

The control memory contains a set of microprogrammed instructions for every command in the CPU's basic instruction set. It performs each instruction by locating the specified

microprogram, and executing it as though it were a small program. When the microprogram is finished, the CPU is signaled to execute the next command, he explained.

Within each microprogram the individual steps are very elementary: they can cause a number to be moved from one register to another or place specified signals on a bus. But by combining individual statements the user can create complex operations such as looping, branching and testing, he said.

A properly designed minicomputer will not need a lot of space in its control store to contain microinstructions. The HP 2100 contains only 256 words of read-only control memory (ROM) for the entire instruction set, Page stated.

Page explained the procedure for creating microprograms on the HP 2100:

- Write the program on coding forms using a defined logic.

- Record the coded program on some input media.

- Process the tape on the mini by using a microassembler that comes with the computer. This process is analogous to a normal machine code assembly, in that a machine intelligible program is produced from a human-readable symbolic origin.

- Feed the finished microprogram into the CPU's ROM control store using the software supplied with the computer.

- Program execution is performed in the same manner as before, except that when the machine executes one of the new commands it will reference the user created microprogramming in the control store.

To provide space for users to enter their own microcode, a Writeable Control Store (WCS) memory is provided that functionally acts the same as the ROM but can be written upon or changed by the user.

Report Urges: Study Units, Internal Needs, Then Buy

By Michael Weinstein

Of the CW Staff

MOORESTOWN, N.J.—IBM's recent announcement of a "low-cost" Character Recognition (OCR) reader (CW, Nov. 11) may lead many users to consider this a valid technique to speed up data entry.

But before they rush out and buy they should do their homework on the types of units available and perform an internal study of the format of their data, according to a Datapro Research special report.

There are basically three types of OCR

All About OCR

units available: mark-sense readers, bar code readers and character readers, the report stated.

Mark-sense units are the simplest. They interpret rows of hand written marks in much the same manner as conventional readers read the holes in punched cards. The mark sense technique is usually limited to inputting numeric data, however, since the preparation of alphabetic input would require the person marking the card to memorize the Hollerith code.

Applications for mark-sense units have traditionally been test scoring, questionnaire reports, input from meters, etc.

Bar code readers can read both numeric and alphabetic information. One difficulty in using these units, however, is that information to be read by the unit is printed in a form that is hard for a person

to read and almost impossible to duplicate by hand, the report noted.

An example of a specialized font used by bar code units is the code used on personal checks to identify the account number.

The character recognition units that read standard letters and numbers are the most elite and the most expensive of the OCR devices.

Most character recognition devices read from preset type fonts—the most common are OCR-A and OCR-B. Selectric typewriters with interchangeable fonts can be used for input preparation.

The growing drawback of character recognition units, according to Datapro, is the cost and the "white tire syndrome" users get carried away with a machine that has all sorts of neat features that they don't really need.

To determine what type of OCR unit they need, users are advised to break input into three areas: data input to application programs, programming input and correction input. By first understanding the form of the input, the user can easily avoid units that he does not need, the report continued.

Applications data represents the largest volume of input work for the typical user and generally is in the form of a large number of records, each in a simple and repeatable format.

Various manufacturers estimate that any installation having from seven to 12 keypunches can profitably make use of OCR equipment, the report said.

Programming input is more complex

and is characterized by low volume and the need to conform to a set language format.

Correction capabilities depend on the form of the original input but generally are more complex. The undesirable character must be displayed but this character must be shown in context to surrounding information.

The full report—"All About Optical Reading"—describes the recognition capabilities, describes specialized input media, error control features, performance, pricing, availability status and applications for 74 OCR readers with price tags from \$1,235 to \$10,000. Copies are available for \$10 from One Corporate Center, Route 38, 08057.

IM-Byte Add-On Replaces IBM 360 Mainframe Memory

MARINA DEL REY, Calif.—An IM byte replacement memory for IBM 360/65, 67 and 75 users who want to enlarge mainframe memory is available from Ampex Corp.

The Ampex Mainframe-ECM memory is divided into two sections: IM bytes of core memory and 32K bytes semiconductor cache memory.

Cycle time for the cache portion is 250 nsec, which when operating with the core memory portion provides an overall cycle time of 750 nsec. This overall speed matches that of the IBM 2365 mainframe memory it replaces without software modification, an Ampex spokesman stated.

"A memory's overall cycle time is determined by a successful data access rate called a hit ratio," the spokesman explained. "We expect an average hit ratio of at least 90% due to the large size of our cache. IBM replaces with cache its 370/155 system and has experienced a hit ratio of 80%," Ampex claimed.

The IM byte Ampex add-on leases for \$8,000/mo on a two-year lease including full maintenance, and sells for \$250,000. Comparable mainframe memories from IBM and other suppliers lease for \$12,000 to \$36,000/mo and sell for \$500,000 to \$1.5 million, Ampex said.

Present users of Ampex ECMs can add the cache memory feature through modification of their existing memories.

Ampex is located at 13031 W. Jefferson Blvd., 90291.

Display Aids Tape Operators

MOHAWK, N.Y.—The VSN-1 volume series number display is mounted over remote tape drive units to visually display mount messages to the operator.

The alphanumeric display unit from Advanced Digital Systems Inc. does not interface with the drive itself; electrical power and signals come from the central controller which interfaces with one or more CPUs, the firm stated.

When a tape is to be mounted, the host CPU transmits tape identification information to the unit. This information is displayed to the operator's attention to the waiting drive.

The unit is available for either a multiple subchannel or a communications channel interface to the CPU. The controller operates off standard 110V 60Hz lines, ADS said.

Monthly rental for a typical 12 tape drive display system including controller and connecting interface is \$19/ display from 146 W. Main St., 13407.



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Burroughs Unveils 4 Data Entry Units

DETROIT—Burroughs has a new series of data recording and sorting equipment directed at users operating 96-column punched card data entry systems.

Of the four models in the PC 900 series, three are data recorders and one is an alphanumeric sorter.

The PC 910 data recorder punches and verifies up to 60 card/min and has a primary input hopper with a capacity of 600 cards and a secondary hopper for 400 cards. Two output stackers are included with each holding 400 cards, the firm stated.

The PC 920 has all the features of the 910 and can also print all of selected data on the card punched. This capability is unique, the firm claimed, in 96-column card off-line equipment because no interaction with a computer system is re-

quired.

The PC 930 includes the data-recording features of the two smaller units with a sorting feature. The unit can sort cards with numeric or alphanumeric data at 300 card/min into six output stackers—each with a capacity of 400 cards.

Company specifications state normal sorting requires an average of 1-1/2 passes per card column for numeric data and 2-1/2 passes per card column for alphanumeric data.

The PC 990 alphanumeric sorters group and sequence 96-column cards at 1,500 card/min into user-specified order. Numeric data is sorted in a single pass and alphabetic data in 1-2/3 passes. The unit's input hopper

can hold 2,000 cards, and 11 output stackers accept 1,200 cards each, the firm stated.

Purchase prices of the PC 910, PC 920 and PC 930 range from \$6,950 to \$12,450 with comparable monthly leases running from \$140 to \$190.



PC 910 Data Recorder

Beware Wogrin Syndrome

AMHERST, Mass.—Dr. Conrad Wogrin directs the University of Massachusetts computer center. He is usually a well-adjusted and patient man, until one of his most important computers goes down a dozen times a day—then even the good doctor becomes a bit vexed.

The Tempo Co. computer threatening to upset Wogrin's life is connected on-line to 90 remote terminals used for student courses and faculty research. About 5,000 people at the school use the system.

"We're not even sure what the problem is, but we think it has to do with the power setup in the building."

But this does not mean that Western Massachusetts Electric is at fault. True, the voltage comes into the computer facility at uneven rates, but this may occur because the heating and air-conditioning are served through the same lines. One possibility is

that the Tempo CPU may be too sensitive to the power fluctuations, he explained.

Tempo has made three trips to the UMass campus and replaced every part of the computer—even though it is not clear the fault is in the computer. But the problems persist.

One day recently, the computer crashed 10 times in six hours and what may come to be known as Dr. Wogrin's Syndrome soon spread among faculty and students alike who were left waiting... and waiting.

Present estimates agree that one hour per day is lost because of the mysterious crashes.

The "cure" may be for UMass to put the computer on its own dedicated power transformer to regulate power flow, or perhaps hook it to a generator. But even this does not guarantee success.

Meanwhile, a message to all logging onto the system reads: "Please file often."

Quantor Common Sense in Grocery Chains



A large grocery chain shelved a competitor system for Quantor COM.

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How Denver General Hospital took the emergency out of its replenishing procedures.

Denver General is a 350-bed hospital in Colorado's capital city.

Like most hospitals, it struggled with a 150-day inventory load that still couldn't eliminate expensive rush ordering.

Its accounting system could only account for about 75% of all items moving out of inventory. Which meant that somewhere along the line, 25% of proper patient charges weren't being made.

This year, Denver General installed SYSTEM TEN* computer by Singer.

Now, Denver General bills from its accounting process 100% of all inventory used.

The hospital is now working with a 30-day inventory, with virtually no rush-ordering.

Every ward and every service orders supplies through SYSTEM TEN. Files are constantly updated. The system prints out on a regular basis: balance on hand, current usage, year-to-date usage, year-to-date receipts, and

current receipts. A stock status report is printed monthly, but could be done daily if needed.

Once a week, purchase orders are generated from the system, with the ability to override orders in order to increase them, decrease them, or not order at all.

Soon, another SYSTEM TEN will take over the hospital's total accounting system, following patients from admission to discharge, tracking charges, preparing bills—even preparing the General Ledger. Together, the two systems will give Denver General an automated cost accounting system.

We can supply you with all the facts on SYSTEM TEN installations for many industries. Specific case histories that include hardware, software, configuration, sample forms, costs. Just contact your nearest Singer Business Machines representative. Or write: Singer Business Machines, San Leandro, California 94577.


*A trademark of the SINGER COMPANY

System Ten by SINGER

HOW TO RENT A MINICOMPUTER.

1 Just try to find one. Until now, rental companies and minicomputer companies just haven't been very interested. The mini business was built on purchase orders, and it's hard to break old habits.

Rental Electronics, Inc. thinks differently. Of course, that shouldn't surprise anyone. REI is number one in U.S. electronic equipment rental; we've gotten there by specializing in original ideas.

2 Pick the right machine. If you were buying a minicomputer, you'd look for a modern machine with the best price/performance on the market. If you rent or lease, you shouldn't have to settle for anything less. That's why REI went to Data General Corporation when we decided to get into the minicomputer business. The Data General Nova 1200 computer you rent/lease from REI is one of the most modern, popular, and reliable minicomputers available.

3 Pick the right configuration. Rental Electronics offers Nova 1200 computers with up to 32K 16-bit words of core memory, along with standard central processor options and interfaces for peripherals.

4 Think about the peripherals you need. We can supply any standard Nova 1200 peripheral, completely interfaced, and ready to run.

5 Get the software you need. A Nova 1200 from Rental Electronics comes with all the software you'd get if you bought the same machine from Data General. That includes standard things like assembler, editor, loader, debuggers, ALGOL, time-share BASIC, and FORTRAN.

6 Arrange for field service. REI offers full On-Call Service contracts... you pay a monthly charge and nothing more. Most important, the computer you rent from REI is serviced by the same Data General staff that has made a reputation as one of the best in the computer business.

7 Arrange the right terms. With a 3-year lease, an 8K Nova 1200 with Teletype (purchase price approximately \$9,800) costs less than \$250 a month; with a 1-year lease, it's less than \$335 a month. The same system, on a month-to-month basis, with maintenance, costs about \$784 a month. Or, under a rental-purchase agreement, it's \$980 a month, with 80% applied to purchase after 6 months.

8 Call us. We know you can't rent a complex piece of equipment from an ad. Call the nearest Rental Electronics office for more details. Lexington, Massachusetts (Corporate Headquarters), Tel. 617/862-6905 • Gaithersburg, Maryland, Tel. 301/948-0620 • Oakland, New Jersey, Tel. 201/337-3757 • Fort Lauderdale, Florida, Tel. 305/771-3500 • Rosemont, Illinois, Tel. 312/671-2464 • Dallas, Texas, Tel. 214/638-4180 • Palo Alto, California, Tel. 415/328-4525 • Anaheim, California, Tel. 714/879-0561 • Ontario, Canada (PLC Leasing Limited), Tel. 416/677-7513. Or call any Data General office.

9 Or Write. Send your name and address to "How to Rent a Minicomputer" Rental Electronics, Inc., 101 Hartwell Avenue, Lexington, Massachusetts 02173, and we'll send you our brochure with all the details. We're serious about minicomputers.



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COMPUTER INDUSTRY



Fabritek's booth lights up the hall with its OEM and end user lines of core memory planes, stacks and systems and extension core memories for 360s.



Mohawk Data Sciences concentrated on OEM exhibits, displaying its Model 201 Cartridge Tape Drive, along with other tape drives, printers and card and tape handling products.



Attendees gather at Powertec's booth to view its line of AC/DC power supplies, DC regulators, inverters and switching power supplies.



Onlookers watch Decision Data's 96-column card punch in action. Decision also displayed other members of its 96-column card line, a data recorder, alphanumeric sorter, and a card reader.

'Lots of Industry Types Here'

By E. Drake Lundell Jr.
Of the Cow Show
ANAHEIM — The last Joint Computer Conference may also have the distinction of being the best in the past three years. This year's conference with 160 exhibitors in 410 booths was close to the best in terms of those figures since 1969 — when almost 1,000 booths were sold — and definitely reversed the downward trend evident in this area for the last three years.

Early attendance figures also appeared better than in recent years, with exhibitors happy not only about the numbers of attendees, but also with the quality of the average show-goer.

"For the past couple of years," one exhibitor said, "we have been getting a good quality of attendees, but the numbers have been bad. But this year it looks like we are getting both — good numbers and we're seeing the type of person we want to see at a show."

"There are lots of industry types here," another said, "and they seem to be from a higher level than in the past couple of years, and definitely of higher quality than the attendees who moshed some of the shows back in the heyday of the JCCs."

The last Fall Joint, another long-time exhibitor said, "has the look and feel of some of the shows in the middle and late 1960s, say 1967 and 1968, or a little earlier."

Court Ruling Said to Favor Patents

NEW YORK — In the recent Supreme Court Benson-Tabbot patent decision, there is no broad ruling implicit that will prevent the future grant of software patents by the Patent Office, according to Morton Jacobs, patent counsel for the Association of Data Processing Service Organizations.

"To the contrary, the Supreme Court decision actually draws a line between what is patentable and what is unpatentable in connection with computer software inventions," Jacobs said.

The Patent Office originally refused to grant a patent to Benson and Tabbot on the grounds that the patent would not be limited to a machine process, but would cover a mental process as well.

The Supreme Court upheld the previous Patent Office refusal because the patent claims would cover the performance of the mathematical process "without any apparatus," which would not be patentable subject matter, he said.

"The problem," he said, "is that there were a few really flush years right after that and everybody began to expect the shows to always draw close to 40,000 and have 1,000 booths. So when the cutback came, everyone compared the size of the shows against those very big ones and not against the smaller ones that were more typical."

That the day of the big shows might really be back was also noted in the plans of the show's sponsor, the American Federation of Information Processing Societies, for the first National Computer Conference next June in New York.

Presently, Aflips has space for about 750 booths, which would be a significant improvement over the past few years, and is guessing near 30,000 attendees.

This space would only occupy two floors of the mammoth coliseum; the Nepon East show has the other two floors, but is planning to use only one for its exhibit space.

Some sources noted that if the big shows are definitely back, Aflips might possibly occupy the third floor of the coliseum, for a total close to the old 1,000-booth shows.

It is hard to tell now, but Aflips has already booked 150 booths for the show and appears confident of selling out the 750, sources said.

Another sign pointing to the possibility of bigger shows once again was the number and diversity of new product introductions during this year's conference.

3330-Like Disk Units Get Interfaces

ANAHEIM — OEM buyers can now get the speed and capacity of IBM 3330-type disk drives with the introduction of two units designed for the non-IBM compatible market, while taking advantage of the 3330-like technology.

Amplex and the Remex unit of Ex-Cut-Off Corp. both introduced devices at the JCC designed with interfaces for non-IBM equipment.

The unit gives manufacturers "more freedom" in designing disk drives into their systems, according to Eugene Prince, vice-president and general man-

ager for the Amplex Computer Products Division.

"The OEM often has had to use unnecessarily complicated IBM-type interfaces even though such complexity was not needed in his system," Prince said.

The interface, he said, is highly simplified between the disk drive and the controller and the unit in operation has a 28-msec average access time compared with the 30-msec average access on the IBM 3330 due to the use of voice coil positioners. The start/stop time is 15 sec opposed to the IBM time of 40 sec, he

added.

The Remex unit does not duplicate the 3330, but uses much of the same technology to produce a 300 M-byte IBM unit.

The Amplex DM-330 is priced between \$16,000 and \$25,000 depending on configuration and quantity, according to Prince.

The Remex 3320 disk system is available in four field-expandable models including the 3320-1, a 75 M-bit configuration, the 3320-2 with 150 M-bit capacity, the 3320-3 with 225 M-bit and the 3320-4 with 300 M-bit.

The units feature a track density of 164 track/in., and a high-speed voice coil actuator with a built-in optical-sensing system.

The average head-positioning time is 30 msec, the firm said, and the average rotational latency of the unit is 8.3 msec with data throughput rates of 6.45 Mbit/sec.

Up to Four Units

Standard features include a belt-driven disk which gives identical performance at 50 or 60 Hz, and a capability of expansion by daisy-chaining up to four units, the firm said.

Several sources at the show indicated there could be a large market for the high-capacity, relatively high-speed disk units, particularly among mini makers and in special-purpose systems.

But most of the enthusiasm was reserved for applications in the area of terminals and data entry, where the higher capacity and speed were seen as real advantages for the 3330-like technology.

processes implemented in software, he said.

"Software is a machine process implemented in computer programs, while hardware is a machine process implemented in computer circuitry."

Jacobs believes that "apparatus claims" directed to a particular machine and to a particular use actually survived the Supreme Court ruling, as evidenced by Justice William Douglas' statement, "It is not the decision precludes a patent for any program servicing a computer. We do not so hold."

Apparatus claims are based on directing a machine in a unique way. Such claims, therefore, qualify as inventions which "control a process or algorithm" for a particular end use, he said. Apparatus patent claims are actually for the control mechanism, rather than for the process or algorithm itself, Jacobs added.

The Supreme Court ruling should actually make it easier to obtain process patents, Jacobs said, since the court denied the Patent Office position "that a process patent must be either tied to a particular machine or apparatus or must operate to change articles or materials to a different state or thing."

The court indicated its support for process patents for "the new, overarching technology," by stating that it was not going to "freeze process patents to old technologies."

"Thus, the machine processes performed by computer systems, be they implemented in software programs or hardware programs, would, in appropriate circumstances, be patentable," Jacobs observed.

The court's decision that formulas and abstract ideas are not patentable should not discourage software companies from filing for inventive machine and machine

More Competition

Cassette Tape Drive Vendors Leery of Floppy Disk

By E. Drake Lundell Jr.
Of the CW staff

ANAHEIM — OEM cassette tape drive manufacturers showed up in quantity at the Fall Joint Computer Conference, boasting of good sales, but with one eye on the rapidly expanding floppy disk manufacturers who are beginning to

COMPUTER ACCESS SYSTEMS INC.



Computer Access Systems

concentrate on some of the same markets.

Almost 10 firms serving the cassette market attended, mainly concentrated in one section of the hall that became known as "cassette row," and while the floppy disk makers were not as well represented, they became a major topic of conversation in the area.

Among the firms displaying cassette devices were Computer Access Systems, International Computer Products, Raymond Engineering, Redaction Corp., Remex, Kybe Corp., Sykes Datacontrol, Techtran Industries and Sycor, which operates an OEM cassette unit in addition to its intelligent terminal line.

"We're seeing good prospects here," a

marketing man at International Computer Products said, but admitted, "The floppy disk prices are coming down to a point now where we are running into them more and more in the marketplace."

"I think that there is a market for both the cassette drives and the disk units," another marketing man said, "but I will have to admit that in the past six months they have been giving us a lot more competition in areas we used to have for ourselves, especially in the terminal business."

"The floppy disk prices are now getting down to our range and are starting to give us some competition," Jerry Short of Redaction admitted, but emphasized his firm had also seen "several" good prospects during the show.

The problem, one marketing man said, is that "we are now getting squeezed from both the cartridge manufacturers which have made some inroads into what we thought would be our market, and now from the floppy disk side of the business."

"There are some companies that want to go with the latest and therefore they are looking at the floppy disk before we have really been able to penetrate any of the markets thoroughly," he added.



International Computer Products, Inc.



Raymond Engineering

"We are still being hurt by the standardization battle," another admitted. "Potential customers aren't sure which way they want to jump and they don't want to get stuck with a system that might be declared non-standard at some later date."

What worries me," one of the marketing men said, "would be customer reaction to the IBM floppy disk system in Europe. We have talked to several customers already who have said they might want to go with a floppy disk system in

case IBM introduces that unit or a similar one to the U.S.

"It is clear," he added, "that they could easily make the floppy disk unit the standard and users always want to stick with a product that has the IBM seal of approval."

Another agreed by noting there had been a slowdown in the cassette order rate in Europe since the IBM announcement.

"I wouldn't say there has been any real market churning, but the rate definitely slowed down and is behind our projections," he admitted, adding, "It seems to be coming back now somewhat to the old rates."

Mini Systems Age Due for a Change

ANAHEIM — General Automation, Inc. foresees a change in the emphasis accorded the minicomputer. Calling the 1960s the "Iron Age" of the minicomputer industry which "was characterized by a scramble among manufacturers to see who could produce the most hardware," GA said the 1970s will be known as the "Systems Age."

"The emphasis will be on systems, rather than on minicomputers, as new technologies give rise to new applications in emerging vertical industries."

In the second stage of development which will open up new applications, new OEM and standard systems will be developed.

"The minicomputer's role will be reduced to that of a component and the industry as it is known today will belong to those companies who have the systems expertise and can add the most contributed value to the minicomputer," according to the firm.

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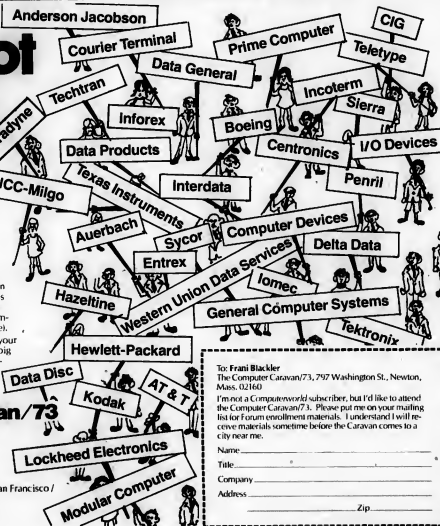


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Minis, Memories, Modems

Some New Faces Introduced to OEM Marketplace

By E. Drake Lundell Jr.

On the CVC start

ANAHEIM—Several firms used the FICC as a platform to launch new products ranging from minicomputers to tape and disk peripherals to output devices.

Computer Automation took the wraps off a new version of the Naled Mini with an 8-bit system that will sell for as low as \$1,450 in quantities of 200.

The "Byte Cruncher" uses 115 basic instructions and comes with 4K of memory in the basic unit expandable to 32K. The direct memory channels (2 standard, up to 64 optional) operate at up to 90K bytes/sec, the firm said.

The memory speed is 1,600 nsec, with add/subtract time of 3.2 μ sec and multiply time of 1.8 msec. The unit also features three standard vectored priority interrupts with up to 256 optional, the firm said.

Data Products unveiled two new systems at the show, one in the medium speed printer area and the other an expansion of its core memory line.

The new 2230 impact printer operates at speeds up to 300 line/min. in a 132 column format and can produce up to six carbon copies.

The unit, which is said to be the first in a planned new series of medium speed printers, is expected to be useful in the small computer systems and terminal area, Data Products said.

The character drum features 64 characters standard with options for 86 and 96 characters and has a modified Ascl font. In the area of core storage the firm announced three new products: the Mini-Store; the Store/2000 which is compatible with the Electronics Memories Micro-memory-2000; and the Store/1885, compatible with the Ampex 1885 memory.

The Mini-Store has a 650 nsec cycle time and 270 nsec access time. The basic module is 8K by 18 bits expandable to 65K by 18.

The cycle time on the Store/1885 is 850 nsec or 750 nsec and access time is 340 nsec or 300 nsec. The basic configuration is 8K by 18 expandable to 65K by 18.

The Store/2000 has a cycle time of 1,000 nsec and access time of 400 nsec and comes in a 4K by 12 bit or 16 bit configuration, expandable to 32K by 18. Ampex announced a new tape drive and core memory for OEMs in addition to a special 3330-type disk drive for the OEM marketplace (see story on page 37).

The TM-100 tape drive has speeds ranging from 10 to 50 in./sec and carries a purchase price of \$4,000 in OEM quantities. The unit has packing densities offered in pairs: 200 and 556 bit/in., 200 and 800 bit/in., and 556 and 800 bit/in. Phase encoded capability for 1,600 bit/in. is also offered, the firm said.

The Model 9180 memory, Ampex said, is the first core memory unit to offer a better cost/performance combination

than semiconductor storage in capacities of less than 4K words of 9 bits.

Using the Ampex Temperature Independent cores, the unit has an access time of about 400 nsec and is priced at less than \$5.01/5bit. The unit is offered with 1K, 2K and 4K 9-bit words and 1K and 2K 18-bit words.

Caelis Memories introduced three new tape drives: the Model 700 with a 7 in. reel, the Model 800 with an 8-1/2 in. reel, and the Model 1000 with a 10-1/2 in. reel.

Error rate for the units is said to be less than 1 bit in 10⁹. The drives feature triple density (200/556/800 bit/in.) and electronically selectable dual density of 800 bit/in. and 1,600 bit/in.

All three of the units are available in 7 or 9 track models. The Model 700 operates at 12.5 in./sec, the Model 800 from 12.5 to 25 in./sec and the model 1000 from 12.5 to 50 in./sec, the firm said.

The Litton OEM Products Division pro-

vided its OEM Model 30 asynchronous serial printer which features 192 print positions, front form assembly, 30 char./sec operation and 47 print characters (26 alpha, 10 numeric and 11 special).

American Data Systems introduced a 4,800 bit/sec MOS modem priced at under \$3,000 or as low as \$1,450 in quantities. The ADS-440/48 is a full duplex modem designed to operate over both conditioned or unconditioned voice grade telephone lines, the firm said.

A switching option provides operation at 2,400 bit/sec and may be used to multiplex two independent 2,400 bit/sec data channels, ADS added.

CPS Inc. announced a high resolution 4-color CRT monitor at the show, the first move by this high power specialist into the display area.

The unit, which offers red, orange, yellow and green colors, is priced at \$11,800 in quantities up to 25, the firm said.

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Services Industry May Grow Rapidly Over Next 7 Years

ANAHEIM—The computer service industry will grow at a rate of 18% a year for the seven-year period starting in 1971, outpacing the computer industry in general, which will enjoy a 15% rate, according to an industry research executive.

David C. Jung, vice-president of Quantum Science Corp., told an FJCC audience that the facilities management (FM) sector would be the most dramatic, with sales leaping from \$645 million last year to \$2.9 billion in 1977.

Currently, 26% of all EDP expenditures is for some type of service, and this proportion will increase to 31% in 1977, Jung predicted.

He also forecast the emergence and increasing popularity of multiservice vendors because users want to deal with fewer vendors, he claimed.

Network information services (time-sharing) will enjoy a growth similar to facilities management, Jung indicated, with that sector quadrupling sales from \$430 million last year to \$1.8 billion in 1977.

Software, Jung predicted, will grow from \$467 million to \$891 million in the period, while batch services will grow at a much slower rate, from \$650 million last year to \$750 million in 1977.

In support of the prediction that multiservice vendors would grow in number, he said these suppliers can enjoy economies in marketing and operation.

"Facilities management," he commented, "is a catalyst for multiservice vendors," since FM firms take over a complete operation, including ownership of products of many vendors.

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MEDIA MANAGEMENT SYSTEMS



Series 50, 6000 Systems Main Growth Contributors

BOSTON—Honeywell's growth in the past year has been largely in the area of the very small and large computer segments of the market, "while in the small and medium we are down a slightly," Stephen F. Keating, Honeywell president, said recently.

Speaking before the Boston Society Analysts, Keating noted that "we think our experience corresponds to the industry booking-growth pattern."

In the large-scale data, Keating stated that "Series 6000 systems shipped and on order total 238 central processors at a value approaching \$500 million."

"Since we have no 600s in inventory and those being returned are scheduled for customers well into 1973, the net yield from this product is very high," he added.

In the middle of the line, Keating noted the Series 2000 was introduced 11 months ago and "to date the value of the 265 Series 2000 computers shipped or on order exceeds \$160 million."

New Models Due

In addition, Keating hinted the firm plans to add several new models to the

Series 2000 line during the coming years. "It is important to note," he said, "that although Series 2000 was intended primarily to give our customer base a means to upgrade, nearly 30% of the orders

Honeywell Speaks Out

received represents systems to supplement existing 2000 systems or for new-name accounts.

"In other words," he said, "they do not involve the return of systems in place."

"Of those sites returning their 200s," he said, "the average value of the upgrade to the 2000 has run approximately 30%. We estimate the net yield-on 2000s to be running at about 50%. That is not as high as the 6000 yield," he admitted, "but it is quite healthy."

At the low end of the line, Keating noted "the French-built Series 50 and particularly the Model 58 have been very successful. More than 3,000 Series 50

systems are installed or on order worldwide."

The major reason for the success of Honeywell in the past few years, Keating said, has been the successful integration of the GE computer business into that of Honeywell after the merger two years ago.

"The product fit we foresaw came to pass: Honeywell products in the broad medium range; GE products bracketing with small and large computers."

"The geographic fit also worked, combining Honeywell's strength in the U.S., the UK and Canada with GE's strengths in Continental Europe and other international markets."

The combination has also permitted economies of scale, Keating claimed.

"We are able to spend over \$100 million a year on research and development—substantially more than anyone else except IBM," he claimed, while noting "this is some \$30 million less than GE and Honeywell were spending separately."

But, he said, "we feel it is better spent

because it now has the broader input of the best of both company's approaches to computer technology."

DP Accounts for 50%

Keating indicated computers now account for roughly 50% of the firm's business with control systems accounting for the rest and "our computer business has increased its contribution to corporate profits since the merger."

Net shipments this year, he added, would run about 15% ahead of last year. "We believe this growth is in line with the industry on a worldwide basis, and therefore we are maintaining or possibly slightly gaining market share."

Keating noted "rental and service revenues have lagged somewhat behind our expectations during the first nine months of this year."

But, he said, "this trend is reversing now as we make shipments out of our backlog of Series 2000 and Series 6000 orders. We believe our rental and service revenue will increase in the fourth quarter."

Foreign Orders & Installations

The State Bank of Czechoslovakia has ordered multiple 620/L-100 minicomputers, multiplexers, controllers and other devices valued at over \$810,000 from Varian Data Machines.

The equipment will primarily act as concentrators and preprocessors in a network linking branch-office banks to DP centers in Prague and Bratislava.

Computer Communications, Inc. has sold a CC-70 front-end processor to The Canada Systems Group Ltd. The system will be used with an IBM 370/168 and 158.

The Banco de Valencia, Spain, has ordered two NCR Century 300s for delivery early in 1974. The system will be connected with terminals in 36 branches.

The Commercial Banking Company of Sydney Ltd. has ordered a Honeywell Model 6040 as the first phase of an on-line system valued at \$2 million. The 6040 will be linked to three Model 316s that will handle communications to terminals in 104 branches.

Pitney Bowes has installed a full-store Spice electronic register system with Pepper price-gag readers at a department store owned by Kaufhof Aktiengesellschaft in Leverkusen, Germany.

The Carron Co., Falkirk, Scotland, has ordered an NCR 100 for use in customer order processing, management inquiry and general accounting.

A Univac 1106 is being installed in the computer center at Sinsk Steelworks, near Zagreb, Yugoslavia. Primary applications will include order entry, inventory control and product quality control, as well as cost accounting.

The Spanish Air Ministry has installed two Burroughs Air Traffic Control Systems in Barcelona and Madrid.

The cooperative data center for Dutch savings banks, the Coöperatieve Administratiecentrale voor Spaarbanken, C.A., has placed a \$4.5 million order with NCR for 440 NCR 270 electronic financial terminals as part of its program to link 300 savings bank branches.

British Overseas Airways Corp. has installed three Datatype Corp. Dataflow Optical Page Readers, minicomputers and tape punchers to complete the initial phase of the development of the Bodica computer system.

Recognition Equipment has received orders for its OCR/S 2000 bank document processing systems totaling \$6.9 million from the Danish Postbank, the Norwegian Postgiro and the Swedish Postal Bank.

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CPU Power

Technician at GTE Sylvania Inc. installs power supply in a CPU—for general-purpose computing—that can retrieve 24-bit words in less than 1 μsec.

Vendors, Take Note of This Discount!

By Lynn Bateman
Special to Computerworld
WASHINGTON, D.C.—When the Federal Government conducts a procurement, a vendor is allowed to stipulate a prompt payment discount on the standard form, but very few computer industry vendors use this option to their advantage.

What most vendors don't know is that the government is obligated to subtract prompt payment discount (ppd) from the evaluated price in determining a winner of the procurement. It is estimated that over 80% of vendors do not understand ppd sufficiently to take advantage of it. Superficially, this may seem unimportant—not so!

Assume, for example, that a vendor wants to set a selling price of \$20,000 for a particular device. When he bids the device in a government procurement, he should price the item at \$20,105 and allow a 5% ppd if paid in 20 days or less. Generally the government will not accept a ppd of more than 5% on the reasonable ground that a larger discount should con-

stitute a general price reduction.

On the other hand, you can price your device at \$20,000 and offer a 1% 20-day discount on the assumption that the government will seldom qualify, so you will be paid the full amount but be evaluated at \$19,800. Even if the government does pay within 20 days, little is lost.

Generally, any time period of less than 20 days is not evaluated because the government cannot anticipate that the disbursing section can meet such a short time frame. The time period is governed by Title 41, Public Contracts, Chapter 1—Federal Procurement Regulations Subpart 1-2.407-3.

In actual practice, the government will take this discount if the bill is paid on time. If the discount is taken after the stipulated time period has elapsed, the contracting officer, when contacted by the vendor, will authorize additional payment by the government to cover this improper action.

In addition to the evaluation advantage provided by a ppd, other advantages ac-

For example, any disbursing officer will pay those bills offering a ppd first. Hence, one improves his cash flow position. Another advantage lies in the fact that the device is evaluated at \$20,000, but you collect \$20,105 if the government is late in paying.

So, you can't lose with a ppd.

Another item to consider is rental credit.

Suppose a particular procurement has as part of the evaluation criteria some form of rental credit. You can offer the rental and suggest that it applies before the bill is taken. In this manner your proposal earns a percentage of the 5% ppd in evaluation credit.

One final note on the human interest side of the ppd—any government contracting officer will have the cockles of his heart warmed to see a ppd. When it appears in a proposal, it is like cookies from home. He feels he is getting something free. Give it to him. You can't lose.

The only way a vendor loses is when he ignores this regulation.

Lynn Bateman is with Federal Marketing Consultants, Inc., Arlington, Va., a firm which assists DP companies with their federal marketing efforts.

Orders & Installations

The National Aeronautics and Space Administration has ordered a Univac 1110 system to replace two 1106s and two 1107s. The 1110 will serve as front end and job scheduler for four 1108s. During Skylab missions, the system will handle data acquisition and reduction via a wideband communications link between the 1110 and Nasa computers in other locations.

Irel Corp. has installed 1 Mbyte of main memory on a 370/155 at Scott Paper Co., Philadelphia.

Ocean Products, Inc., Dover, Fla., has ordered an NCR 101 to monitor sales, inventory and accounting of its breaded and frozen shrimp.

Rensselaer Polytechnic Institute has installed an Information Displays, Inc. Idiom computer-driven display system in its School of Engineering. The unit will be used to investigate the use of interactive graphics in a variety of process control applications.

The Rochester Institute of Technology has installed Datsatype Corp.'s Setype (OCR) system at its school of printing for use in vocational instruction classwork.

The Associated Press has ordered 300 data TE-1200 modems from Collins Radio Co. for installation in AP offices around the nation.

Mead Data Corp. has installed 20 Editron 100 intelligent display stand-alone units and ordered 80 additional units from SYS Computer Corp. The units will be installed in accounting firms and the Securities & Exchange Commission.

The Cabell Huntington Hospital, Huntington, W. Va., has installed an NCR 50 to handle business applications.

The Grand Union Co., a supermarket chain, has licensed the Acres telecommunications package from Trilog Associates, Inc.

Galaxy Foods, Inc. is installing a computerized order entry and delivery system developed by Incotel, Ltd. The system uses a Varian 620/L-1000 mini and modular software.

Northeast Medical Suppliers has ordered CI-2 minicomputers from Computer Interactions, Inc. for installation at all of the firm's locations, where the units will keep patient prescription activity and history records. The systems will also be used to alert personnel to possible harmful reactions caused by mixing different prescription drugs.

Some IBM 360 users have chosen to upgrade their existing systems rather than jump into a 370. Many others still face this important decision. And if you're in that position, our January 21st Supplement will be a big help.

Supplement Editor Ron Frank has talked to users who have upgraded, and he'll report on their experiences and problems. Cost factors will be analyzed, and there will be a survey of the various tools now available for upgrading a 360, including:

- Independent main memories
- Faster peripherals
- D.A.T. Boxes
- Independent software

If you're a 360-user, you'll find a lot to think about in this supplement. And if you have a product or service which can up a 360, you should be advertising in this special supplement. Your Computerworld representative can give you all the details. Or call Judy Milford at (617) 552-5505.

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'Used' Market Gets Group Voice

KANSAS CITY — A trade association formed to give voice to the used computer dealers was formed by 34 firms meeting here recently.

The Computer Dealers Association "will be the industry voice to mainframe manufacturers, leasing companies, independent peripherals manufacturers, the U.S. Government (to help the government expand its understanding and acquisition of used computers and peripherals), freight forwarders, insurance companies and third-party maintenance companies," the organizers said.

Broaden Market Awareness

The group "will also strive to broaden the computer users' awareness of the billion dollar used computer market," the founders added, noting that of the approximately \$30 billion in computer-related installed equipment, \$10 billion is owned by non-manufacturers.

President of the new organization is A.F. Monosson, president of American Used Computer Corp., and the vice-presidents include Edward Cherney, president of CMI Corp., and Norman Burger, president of Corporate Computers Inc.

Founding membership includes, in addition to the above, Associated Computer Services Equipment Corp., Comdisco Inc., Computer Resale Exchange, Computer Resale Corp. Ltd., Computer Systems/Graphics Inc., Computer Trade Corp., Computer Wholesale Corp., Confidential Information Systems and Data Automation Services.

Others are: DP Equipment Marketing Corp., Dataserv Equipment, Inc., Econocom, Evergreen Computer & Financial, Inc., Forsythe/McArthur Associates, Inc., The Halsey Corp., HNB Marketing Co., ICC Computer Corp., I.O.A. Data Corp., IPS Computer Marketing Corp., M.I. Johnston & Associates, Inc., Lunceford & Associates, Inc., LXX Computers & Per-

ipherals, Inc., George S. McLaughlin Assoc., Inc., William Manton Co., Nationwide Computers, NVC Computer Sales, Inc., Oliver & Associates, Professional Re-marketing Organization, Thomas Computers, Time Brokers, Inc. and Tradacom, Inc.

Information Systems Expected to Fill Needs of Utilities

LAKE BUENA VISTA, Fla. — Computerized information systems are needed in the nation's electric and gas companies as their business environment becomes more political and complex, according to Leonard A. Muller, president of GTE Information Systems.

Speaking at the 20th annual Public Utility Information Systems Conference here recently, Muller said "management decisions can no longer be made unilaterally but are increasingly subject to public scrutiny and review."

"Customers are becoming more systems-oriented, using computers to study problems that were formerly considered solely in the utility's domain."

At the same time, Muller noted the computer industry was also changing with more and more of the DP dollar being spent outside the computer room.

"While technology has given us the capacity to centralize with huge data bases," he said, "it has also provided us with the power to decentralize with intelligent terminals and distributed networks that are more responsive to the end user."

"The most important long-term effect of our data communications systems will be decentralized systems, with more computer power in the hands of the end users, the people who need it," he added.

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"I wouldn't be in this job if it weren't for ACM" says Dorothy. "I had been involved in DP education and marketing for a number of years. My ACM Committee work and chapter meetings resulted in a lot of additional contacts. One of them led to this job."

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my leadership experience in motivating volunteers at ACM to do a better job in DP training work at Banker's Trust. I really think ACM has helped me find—and grow in—a new, satisfying career.

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Industrial Robot Uses TV Camera,
Mini to Store Images for Selection

TOKYO—Hitachi has developed an industrial robot system that can recognize and select specific objects from a mixture passing by on a conveyor belt.

The Hitachi Visual Image Processing Robot uses a television camera attached to a mini capable of storing 32 images. In the selection process the camera scans the objects and feeds the data on the images to the computer. The systems can discern shape, size, position and posture

of the objects.

The pattern is compared by the computer with the patterns in memory and if action is needed, an order is given to the handling mechanism.

To store images in the system, the object is placed below the camera and a special function key is pressed causing the object to be stored. When the belt is moving, Hitachi said the system could recognize objects at the rate of around one a second.

Contracts

Advanced Memory Systems, Inc. has received a contract valued at over \$1 million from Memory Technology, Inc. for the AMS 6003, a 2K word by 1 bit, P-channel dynamic RAM.

Vogue Instrument Corp. has received a contract from Emerson Electric Co. for 65 Model 400C High-Speed Line Printers for use in a computerized label printing system.

General Electric Co. has received a contract from the federal Maritime Administration to develop a satellite-aided merchant-ship operations control system. The system will use a shipboard computer linked through orbiting satellites to a shore-based computer.

TRW Data Systems has agreed to purchase a minimum of 100 Computer Terminal Corp. Datapoint 2200 systems over the next two years. The units will be used as part of an on-line credit verification system for the retail and banking industries.

Georgetown University Hospital, Washington, D.C., has selected Computers, Inc. to provide facilities management services.

Computer Sciences Corp. has received a \$3.1 million Army contract for programming for the Safeguard System Command and the Army Ballistic Missile Defense Agency.

International Telephone & Telegraph Corp.'s Defense Communications Division has received a \$7 million Army contract for a prototype communications switching system. Burroughs Inc. is a subcontractor.

Datascrap Corp. will supply Bostec Co. with four DC 6024/5 computers for use in real-time simulators for the B-1 bomber program.

AI Corp. was issued a \$5.3 million Air Force contract for computer test sets for F4 aircraft.

AMI Industries, Inc. has received a contract from the First National City Bank of New York for data processing of its direct marketing activities.

Bunker Ramo's Electronic Systems Division has received a contract from McDonnell Douglas Automation Co. for the development of a factory data entry system. The system will be installed initially at the Douglas Aircraft Co., where it will be used to enter production and tooling orders into the central DP system.

System Development Corp. has been awarded a \$10.3 million contract to continue as computer program integration contractor for the Air Force Satellite Control Facility (AFSCF).

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COMPUTERWORLD
 THE NEWSWEEKLY FOR THE COMPUTER COMMUNITY

DP Lagging in Bahamas

By Bohden Suprowicz

NASSAU, Bahamas — Although there are 354 different banks registered in the Bahamas and several top U.S., Canadian and British banks operate branches in Nassau and Freeport, there are only a dozen small- to medium-sized computers in all of the 700 islands. Only one, a small IBM System 3, is reportedly installed in a local Nassau bank.

"What's incredible," said A. Ross, vice-president of Caribbean Computers Ltd., "is that the banks here are not even using magnetic code on checks and most operations are done manually."

Another computer firm, Data Management Ltd., proposed setting up a time-sharing system for groups of participating banks but became discouraged when little interest was shown.

Computerization of Bahamian banks is not the major objective of Caribbean Computers Ltd., which started operations only last March as a computer services firm and is the authorized distributor for Honeywell computer hardware in Bahamas, Jamaica and other Caribbean areas.

H-58 Bought

Three months ago the company paid a small Honeywell H-58 system to a hotel chain and included in the package specialized software for hotel reservations, billing and accounting functions. Ross sees considerable potential for this service, which he feels is price accessible for many smaller hotels throughout the Caribbean area.

Even in the industry there is little computerization so far, as many large hotels belong to international chains and use only a communications terminal.

Only Kings Inn in Freeport operated a local IBM 360/20 on its premises until a year ago, when the hotel and its computer were destroyed in a fire. The hotel is opening up again this coming season with an IBM S/3 as a replacement.

The initial government installation quickly expanded to an IBM 360/20 system and is now being replaced by an IBM 360/30 with 96K of memory and five terminals. The new system will handle immigration, payroll and utilities billing as well as customs duty applications.

Aussies Use Mini In Stress Grading

Special to Computerworld

SYDNEY, Australia — A mini-computer, designed and built in Australia by Plessey Telecommunications Ltd. of Meadowbank, New South Wales, is bringing home the export dollar.

Part of a timber stress grading machine, the mini has been sent to New Zealand, Japan, South Africa, the Philippines, the U.S. and the UK, as well as Australia.

Although a simple machine programmed by insertion of one of a selection of circuit cards, its application has brought an optimism to Australia's growing DP industry.

The grading machine is one of the few to be approved in the UK and the U.S. by timber research and building code authorities.

Timber passing through the machine is subjected to a known load and deflection measured at six-inch intervals. The mini does the necessary calculations and allocates one of five grades to each section tested.

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POSITION ANNOUNCEMENTS

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Director is responsible for expanding educational use of computer and for general administrative oversight of the facility (terminal linked to U. of Iowa IBM 360/50). College machine experience and administrative experience desired. Position available Summer, 1973. For details write: Associate Dean of Administration, Grinnell College, Grinnell, Iowa 52112.

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Duties will include assisting with the general teaching work of the Department, software development and advisory assistance to computer users. Active research will be encouraged.

Applicants should hold a second degree either in computer science or in a major applications discipline, and preference will be given to those with experience or research interests in data communications or virtual memory machine.

Salary will be on the scale for Lecturers — NZ\$ 5,588-57,148 per annum. Below NZ\$ 100 equals approximate. (US \$119; SA \$100). Salary scales are subject to both triennial review and cost-of-living adjustment.

Further particulars are available from the Secretary-General, Association of Commonwealth Universities, 35 Gordon Square, London WC1, or from the undersigned. Applications close in New Zealand and London on 15th December 1972. Late applications will be considered.

J.W. Hayward
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Anderson Jacobson Earnings Rise 65% In Half, Revenues Set Record

SUNNYVALE, Calif. — Anderson Jacobson, Inc. chalked up its fifth consecutive new high for revenues in a six-month period, with earnings up 65% over the year-ago period. Incoming new orders ran 32% ahead of orders for the same period last year, according to the firm.

Revenues for the half year ended Sept. 30 reached \$2.5 million compared with \$2 million in 1971, while earnings, including a \$36,694 special credit, climbed to \$162,694 or 6 cents a share, compared with \$76,061 or 3 cents a share in the 1971 period.

A gain in second-quarter revenues and earnings was achieved despite the fact that outright sales in the 1971 quarter were "unusually high" because of a bulge in OEM sales, according to President Raymond E. Jacobson. In the three months, revenues rose to \$1.3 million from \$1.2 million, and earnings to \$75,182

or 3 cents a share, from \$57,926 or 2 cents a share.

Jacobson explained to shareholders that Anderson Jacobson's product line of couplers, modems and keyboard printer terminals is not computer peripheral equipment in the true sense of the word, but the firm is more a part of the "data communications" world. In commenting on the industry, Jacobson said: "Even considering AT&T, which does build modem equipment, there are, at this point, no strongly dominant companies in the computer terminal and data communications field as there are in the computer mainframe and peripheral field."

"We believe, therefore that while competition is keen in our business, independent companies like ours can compete very effectively and that we shall grow substantially."

Inforex Has Profitable 9 Months

BURLINGTON, Mass. — Key-to-disk maker Inforex has put two profitable quarters back to back, and showed a profit for the nine months ended Sept. 29.

With a healthy boost from \$1.9 million in third-quarter sales to Leasing II, Inforex earned \$525,220 or 23 cents a share, compared with a loss of \$1.4 million or 74 cents a share in the comparable 1971 period.

The 1972 figure includes a \$278,000 tax credit.

Revenues for the quarter rose to \$6.1 million from \$1.2 million in the same 1971 period.

Rental Revenues Up

Rental and service revenues for the quarter were \$2.5 million, up 25% over the previous quarter, and over three times the amount for the third quarter last year, President T.B. Horgan noted.

Order backlog totaled \$10.7 million in sales value at the end of September, compared with \$8.2 million a year ago.

In the nine months, earnings, including a \$453,000 tax credit,

totalled \$535,083 or 23 cents a share, compared with a loss of \$3.8 million or \$2.05 a share in the 1971 period. Revenue rose to \$15.8 million from \$2.8 million a year ago.

Remcom Sets Financing

GARLAND, Texas — About \$17 million in financing has been arranged through Transamerica Computer Corp. and Industrial Leasing Corp. for Remcom Corp., a subsidiary of SCS Corp.

Under the agreement the two firms will purchase Remcom equipment, subject to leases with Remcom customers. Remcom will retain distribution and service responsibilities.

The lease financing will cover Remcom's production of remote batch terminals from now through 1973, SCS said.

The agreement includes about \$16 million in lease financing from the two firms and the sale of \$750,000 of convertible debentures to Transamerica.



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Terminal Picture Cloudy as Sycor, Computer Terminal and Data 100 Report

Sycor Inc. reported record revenue for the third quarter, while Computer Terminal Corp. ended the year with a 40.8% reduction in losses, but a third terminal firm, Data 100, saw its third-quarter loss increase along with revenues.

Sycor third-quarter revenues reached \$3.8 million, compared with \$1.8 million last year. Earnings, including a \$140,000 tax credit, totaled \$275,100 or 12 cents a share compared with a loss in the year-ago period.

The nine-month period also showed a considerable turnaround, with revenues of \$9.9 million, an 83% increase over the \$5.4 million last year. Earnings, including a \$220,000 tax credit, rose to \$434,300 or 17 cents a share compared with a loss of almost \$1.5 million or \$1.11 a share for the 1971 period.

Sales to the export market and the planned expansion of domestic marketing have contributed equally to the increase in revenue.

Nicks & Dimes

Consumer Marketing and Real Estate Services is expected to contribute about 80% of Computing & Software's 1972 profits, and almost two-thirds of revenues, according to President Norman E. Friedman.

\$\$\$

Potter Instrument anticipates sales in the \$50 million range for fiscal 1973. Profitability will depend on how rapidly the firm can move into full production of its new products, such as tape and disk drives and printers.

\$\$\$

Computer Products had its fifth consecutive profitable quarter, with record revenue orders and backlog for the period ended Oct. 1. Earnings reached \$119,469 compared with a loss of \$68,364 a year ago.

\$\$\$

Software International posted its fifth consecutive year of profitable operation.

\$\$\$

Core production capacity at Data Products more than doubled in fiscal 1972 and is being doubled again in fiscal 1973.

\$\$\$

Planning Research has obtained \$12 million of long-term refinancing with a group of institutional investors.

\$\$\$

Com-Share had a larger operating profit in the first quarter ended Sept. 30 than in all of the preceding year. Earnings, including a \$62,000 tax credit, totaled \$123,473 compared with a loss of \$104,288 in the year-ago period.

\$\$\$

Sold Out—A 279,383-share secondary public offering of Computer Automation Inc. common was snapped up at \$13.25 a share.

\$\$\$

Rockwood Computer's DP leasing operation incurred a loss in the six months ended Sept. 30. Although the unit reduced the amount of equipment off rent, it experienced lower rates in remarketing this equipment.

ues, according to President Samuel N. Irwin.

Computer Terminal cut its 1972 loss to \$2.2 million or 67 cents a share from \$3.8 million or \$1.25 a share in 1971. Revenues rose 82.5% to \$5.4 million from almost \$3 million for the year ended July 31, 1971.

Datapoint 2200 shipments accounted for 61.7% of the year's shipments and 87.4% of the year-end backlog, according to President J.P. Ray.

He projected the firm would soon be shipping Datapoint 2200 systems at a rate approximately 45% greater than the shipping rate at the end of July.

Computer Terminal expects to be operating profitably on a month-to-month basis before the end of the 1973 fiscal year, he added, noting also that the firm plans to obtain additional outside financing to further increase

its production and shipping levels.

Data 100 reduced its losses for the second consecutive quarter, but the third-quarter loss totaled \$1.3 million or 64 cents a share, including a \$200,000 special charge, compared with \$1 million or 82 cents a share in the 1971 period.

Revenues rose to \$2.7 million compared with \$1.1 million in the year-ago period.

In the nine months, revenue surged to \$6.8 million from \$2.4 million a year ago, while the loss totaled \$4.7 million or \$3.05 a share compared with \$3.1 million or \$2.67 a share in 1971.

Under an agreement for sales to Randolph Computer Corp., Data 100 expects to record transactions as sales, and "on this basis we expect to be profitable starting in the quarter ending Dec. 31, 1972."

Record Earnings Should Lift Intel

SAN FRANCISCO

Undaunted by a nine-month loss of \$2.6 million, and heartened by the on-schedule third-quarter earnings of \$332,000, Intel Corp. President Peter S. Redfield is predicting 1972 will be profitable.

Record earnings are expected in the fourth quarter, which will be sufficient to offset the 35 cents-a-share loss accumulated to date, he said.

Shipments of the 7330 disk drive system and returns from the packaged lease program are important factors in the upswing, he noted.

Intel's financial and DP service activities are growing in pre-tax income at a rate of better than 50% per year compounded, Redfield noted.

In addition, the sale of the Office Products Division has "stripped the decks of our major money loser," as well as contributed about \$20 million to the kitty, he said.

In the quarter, revenues declined to \$23.1 million from \$25.5 million a year ago, while earnings climbed to \$232,000 or 1 cent a share from \$77,000 or 1 cent a share.

The nine-month revenues also dropped, to \$62.7 million from \$81.1 million, and the loss totaled \$2.6 million or 35 cents a share compared with \$3.3 million or 46 cents a share in the year-ago period.

The 1971 results were restated to show separately the results of discontinued operations.



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